

**10/52/411**

## SEQUENCE LISTING

**DT09 Rec'd PCT/PTO 11 MAR 2005**

<110> Health Protection Agency  
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<120> Recombinant Toxin Fragments

<130> MRM/25972

<150> US 10/241,596

<151> 2003-09-12

<160> 175

<170> PatentIn version 3.2

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<212> DNA

<213> Clostridium botulinum

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gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc	144
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg	
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gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa	192
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu	
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Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr	
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gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag	288
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu	
85 90 95	
cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc	336
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val	
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Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys	
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aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile 145 150 155 160	480
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Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg	420	425	430	
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Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys	435	440	445	
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Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu	485	490	495	
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Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu	515	520	525	
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Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu	545	550	555	560
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His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu	565	570	575	
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Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu	645	650	655	

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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
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Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
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Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
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Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
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Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
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Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn

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 Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
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 Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
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Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
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Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
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Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
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Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
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 Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro  
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 Asp Leu Asn Pro Pro Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr  
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Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe	
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Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr	
515 520 525	
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Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu	
625 630 635 640	
act agc gaa gta agt act acg gat aaa att gcg gat ata act ata att	1968
Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile	
645 650 655	
att cca tat ata gga cct gct tta aat ata ggt aat atg tta tat aaa	2016
Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys	
660 665 670	
gat gat ttt gta ggt gct tta ata ttt tca gga gct gtt att ctg tta	2064
Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu	

- 11 -

675	680	685	
gaa ttt ata cca gag att gca ata cct gta tta ggt act ttt gca ctt Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu 690 695 700			2112
gta tca tat att gcg aat aag gtt cta acc gtt caa aca ata gat aat Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn 705 710 715 720			2160
gct tta agt aaa aga aat gaa aaa tgg gat gag gtc tat aaa tat ata Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile 725 730 735			2208
gta aca aat tgg tta gca aag gtt aat aca cag att gat cta ata aga Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg 740 745 750			2256
aaa aaa atg aaa gaa gct tta gaa aat caa gca gaa gca aca aag gct Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala 755 760 765			2304
ata ata aac tat cag tat aat caa tat act gag gaa gag aaa aat aat Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn 770 775 780			2352
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aat aaa gct atg att aat ata aat aaa ttt ttg aat caa tgc tct gtt Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val 805 810 815			2448
tca tat tta atg aat tct atg atc cct tat ggt gtt aaa cgg tta gaa Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu 820 825 830			2496
gat ttt gat gct agt ctt aaa gat gca tta tta aag tat ata tat gat Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp 835 840 845			2544
aat aga gga act tta att ggt caa gta gat aga tta aaa gat aaa gtt Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val 850 855 860			2592
aat aat aca ctt agt aca gat ata cct ttt cag ctt tcc aaa tac gta Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val 865 870 875 880			2640
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&lt;213&gt; Clostridium botulinum

&lt;400&gt; 4

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- 12 -

Glu Phe Glu Leu Pro Gly Thr Met Glu Phe Val Asn Lys Gln Phe Asn  
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Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro  
 35 40 45

Lys Tyr Gly Gln Met Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys  
 50 55 60

Ile Trp Val Ile Pro Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly  
 65 70 75 80

Asp Leu Asn Pro Pro Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr  
 85 90 95

Asp Ser Thr Tyr Leu Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys  
 100 105 110

Gly Val Thr Lys Leu Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg  
 115 120 125

Met Leu Leu Thr Ser Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser  
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Thr Ile Asp Thr Glu Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val  
 145 150 155 160

Ile Gln Pro Asp Gly Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile  
 165 170 175

Ile Gly Pro Ser Ala Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly  
 180 185 190

His Glu Val Leu Asn Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr  
 195 200 205

Ile Arg Phe Ser Pro Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu  
 210 215 220

Val Asp Thr Asn Pro Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro  
 225 230 235 240

Ala Val Thr Leu Ala His Glu Leu Ile His Ala Gly His Arg Leu Tyr  
 245 250 255

Gly Ile Ala Ile Asn Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala  
 260 265 270

Tyr Tyr Glu Met Ser Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr  
 275 280 285



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Phe Gly Gly His Asp Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu  
 290 295 300

Phe Arg Leu Tyr Tyr Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu  
 305 310 315 320

Asn Lys Ala Lys Ser Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met  
 325 330 335

Lys Asn Val Phe Lys Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly  
 340 345 350

Lys Phe Ser Val Asp Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu  
 355 360 365

Thr Glu Ile Tyr Thr Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu  
 370 375 380

Asn Arg Lys Thr Tyr Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn  
 385 390 395 400

Ile Val Pro Lys Val Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg  
 405 410 415

Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn  
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Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe  
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Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser  
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Leu Asp Lys Gly Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val  
 465 470 475 480

Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn  
 485 490 495

Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala  
 500 505 510

Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr  
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Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser  
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Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe

- 14 -

545                      550                      555                      560  
 Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr  
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 Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr  
                                  580                      585                      590  
 Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe  
                                  595                      600                      605  
 Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala  
                                  610                      615                      620  
 Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu  
                                  625                      630                      635                      640  
 Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile  
                                  645                      650                      655  
 Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys  
                                  660                      665                      670  
 Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu  
                                  675                      680                      685  
 Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu  
                                  690                      695                      700  
 Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn  
                                  705                      710                      715                      720  
 Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile  
                                  725                      730                      735  
 Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg  
                                  740                      745                      750  
 Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala  
                                  755                      760                      765  
 Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn  
                                  770                      775                      780  
 Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile  
                                  785                      790                      795                      800  
 Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val  
                                  805                      810                      815

- 15 -

Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu  
820 825 830

Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp  
835 840 845

Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val  
850 855 860

Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val  
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aac ggt gtt gac att gcc tac atc aaa att cca aag tac ggc cag atg 96  
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Lys Tyr Gly Gln Met  
20 25 30  
cag ccg gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg 144  
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
35 40 45  
gaa cgc gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg 192  
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
50 55 60  
ccg gaa gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg 240  
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
65 70 75 80  
agc aca gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta 288  
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
85 90 95  
ttc gag cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca 336  
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
100 105 110  
atc gtc cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag 384  
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
115 120 125  
ttg aag gtt att gac act aac tgc att aac gtg atc caa cca gac ggt 432  
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln pro Asp Gly  
130 135 140

- 16 -

agc tac aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg	480
Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala	
145 150 155 160	
gac att atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac	528
Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn	
165 170 175	
ctg acg cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca	576
Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro	
180 185 190	
gac ttc acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg	624
Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro	
195 200 205	
ctg ttg ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca	672
Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala	
210 215 220	
cac gag ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac	720
His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn	
225 230 235 240	
ccg aac cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt	768
Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser	
245 250 255	
ggt tta gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat	816
Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp	
260 265 270	
gcg aag ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac	864
Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr	
275 280 285	
tac aac aag ttt aaa gat att gca agt aca ctg aac aag gct aag tcc	912
Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser	
290 295 300	
att gtg ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa	960
Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys	
305 310 315 320	
gag aaa tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat	1008
Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp	
325 330 335	
aaa tta aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca	1056
Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr	
340 345 350	
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Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr	
355 360 365	
ttg aat ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta	1152
Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val	
370 375 380	
aat tac aca ata tat gat gga ttt aat tta aga aat aca aat tta gca	1200
Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala	
385 390 395 400	
gca aac ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act	1248
Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr	

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gta aga ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr 435 440 445			1344
aat aag gca tta aat gat tta tgt atc aaa gtt aat aat tgg gac ttg Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu 450 455 460			1392
ttt ttt agt cct tca gaa gat aat ttt act aat gat cta aat aaa gga Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly 465 470 475 480			1440
gaa gaa att aca tct gat act aat ata gaa gca gca gaa gaa aat att Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile 485 490 495			1488
agt tta gat tta ata caa caa tat tat tta acc ttt aat ttt gat aat Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn 500 505 510			1536
gaa cct gaa aat att tca ata gaa aat ctt tca agt gac att ata ggc Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly 515 520 525			1584
caa tta gaa ctt atg cct aat ata gaa aga ttt cct aat gga aaa aag Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys 530 535 540			1632
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gta aag aaa gtt aat aaa gct acg gag gca gct atg ttt tta ggc tgg Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp 595 600 605			1824
gta gaa caa tta gta tat gat ttt acc gat gaa act agc gaa gta agt Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser 610 615 620			1872
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cct gct tta aat ata ggt aat atg tta tat aaa gat gat ttt gta ggt Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly 645 650 655			1968
gct tta ata ttt tca gga gct gtt att ctg tta gaa ttt ata cca gag Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu 660 665 670			2016

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aat gaa aaa tgg gat gag gtc tat aaa tat ata gta aca aat tgg tta Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu 705 710 715 720	2160
gca aag gtt aat aca cag att gat cta ata aga aaa aaa atg aaa gaa Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu 725 730 735	2208
gct tta gaa aat caa gca gaa gca aca aag gct ata ata aac tat cag Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln 740 745 750	2256
tat aat caa tat act gag gaa gag aaa aat aat att aat ttt aat att Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile 755 760 765	2304
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tct atg atc cct tat ggt gtt aaa cgg tta gaa gat ttt gat gct agt Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser 805 810 815	2448
ctt aaa gat gca tta tta aag tat ata tat gat aat aga gga act tta Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu 820 825 830	2496
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aca gat ata cct ttt cag ctt tcc aaa tac gta gat aat caa aga tta Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu 850 855 860	2592
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- 19 -

Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
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Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
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Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
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Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
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Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
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Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
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Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
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Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
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Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
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Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser

- 20 -

290

295

300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
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Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
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Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
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Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
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Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu  
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Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly  
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Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile  
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Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn  
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Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly  
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Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys  
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Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu  
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Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu  
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Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr  
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Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp  
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Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser  
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Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly  
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Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly  
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Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu  
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Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala  
 675 680 685

Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg  
 690 695 700

Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu  
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Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln  
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Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile  
 755 760 765

Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile  
 770 775 780

Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn  
 785 790 795 800

Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser  
 805 810 815

Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu  
 820 825 830

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Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser  
835 840 845

Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
850 855 860

Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
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1 5 10 15  
gtt gat att gct tat ata aaa att cca aat gca gga caa atg caa cca 96  
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
20 25 30  
gta aaa gct ttt aaa att cat aat aaa ata tgg gtt att cca gaa aga 144  
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
35 40 45  
gat aca ttt aca aat cct gaa gaa gga gat tta aat cca cca cca gaa 192  
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
50 55 60  
gca aaa caa gtt cca gtt tca tat tat gat tca aca tat tta agt aca 240  
Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
65 70 75 80  
gat aat gaa aaa gat aat tat tta aag gga gtt aca aaa tta ttt gag 288  
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95  
aga att tat tca act gat ctt gga aga atg ttg tta aca tca ata gta 336  
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110  
agg gga ata cca ttt tgg ggt gga agt aca ata gat aca gaa tta aaa 384  
Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125  
gtt att gat act aat tgt att aat gtg ata caa cca gat ggt agt tat 432  
Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140  
aga tca gaa gaa ctt aat cta gta ata ata gga ccc tca gct gat att 480  
Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160  
ata cag ttt gaa tgt aaa agc ttt gga cat gaa gtt ttg aat ctt acg 528  
Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr

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165				170				175								
cga	aat	ggt	tat	ggc	tct	act	caa	tac	att	aga	ttt	agc	cca	gat	ttt	576
Arg	Asn	Gly	Tyr	Gly	Ser	Thr	Gln	Tyr	Ile	Arg	Phe	Ser	Pro	Asp	Phe	
			180					185					190			
aca	ttt	ggt	ttt	gag	gag	tca	ctt	gaa	gtt	gat	aca	aat	cct	ctt	tta	624
Thr	Phe	Gly	Phe	Glu	Glu	Ser	Leu	Glu	Val	Asp	Thr	Asn	Pro	Leu	Leu	
			195				200					205				
ggt	gca	ggc	aaa	ttt	gct	aca	gat	cca	gca	gta	aca	tta	gca	cat	gaa	672
Gly	Ala	Gly	Lys	Phe	Ala	Thr	Asp	Pro	Ala	Val	Thr	Leu	Ala	His	Glu	
	210					215					220					
ctt	ata	cat	gct	gga	cat	aga	tta	tat	gga	ata	gca	att	aat	cca	aat	720
Leu	Ile	His	Ala	Gly	His	Arg	Leu	Tyr	Gly	Ile	Ala	Ile	Asn	Pro	Asn	
225					230				235						240	
agg	gtt	ttt	aaa	gta	aat	act	aat	gcc	tat	tat	gaa	atg	agt	ggg	tta	768
Arg	Val	Phe	Lys	Val	Asn	Thr	Asn	Ala	Tyr	Tyr	Glu	Met	Ser	Gly	Leu	
				245				250						255		
gaa	gta	agc	ttt	gag	gaa	ctt	aga	aca	ttt	ggg	gga	cat	gat	gca	aag	816
Glu	Val	Ser	Phe	Glu	Glu	Leu	Arg	Thr	Phe	Gly	Gly	His	Asp	Ala	Lys	
			260					265					270			
ttt	ata	gat	agt	tta	cag	gaa	aac	gaa	ttt	cgt	cta	tat	tat	tat	aat	864
Phe	Ile	Asp	Ser	Leu	Gln	Glu	Asn	Glu	Phe	Arg	Leu	Tyr	Tyr	Tyr	Asn	
		275					280					285				
aag	ttt	aaa	gat	ata	gca	agt	aca	ctt	aat	aaa	gct	aaa	tca	ata	gta	912
Lys	Phe	Lys	Asp	Ile	Ala	Ser	Thr	Leu	Asn	Lys	Ala	Lys	Ser	Ile	Val	
	290					295					300					
ggt	act	act	gct	tca	tta	cag	tat	atg	aaa	aat	gtt	ttt	aaa	gag	aaa	960
Gly	Thr	Thr	Ala	Ser	Leu	Gln	Tyr	Met	Lys	Asn	Val	Phe	Lys	Glu	Lys	
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tat	ctc	cta	tct	gaa	gat	aca	tct	gga	aaa	ttt	tcg	gta	gat	aaa	tta	1008
Tyr	Leu	Leu	Ser	Glu	Asp	Thr	Ser	Gly	Lys	Phe	Ser	Val	Asp	Lys	Leu	
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aaa	ttt	gat	aag	tta	tac	aaa	atg	tta	aca	gag	att	tac	aca	gag	gat	1056
Lys	Phe	Asp	Lys	Leu	Tyr	Lys	Met	Leu	Thr	Glu	Ile	Tyr	Thr	Glu	Asp	
			340					345					350			
aat	ttt	gtt	aag	ttt	ttt	aaa	gta	ctt	aac	aga	aaa	aca	tat	ttg	aat	1104
Asn	Phe	Val	Lys	Phe	Phe	Lys	Val	Leu	Asn	Arg	Lys	Thr	Tyr	Leu	Asn	
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ttt	gat	aaa	gcc	gta	ttt	aag	ata	aat	ata	gta	cct	aag	gta	aat	tac	1152
Phe	Asp	Lys	Ala	Val	Phe	Lys	Ile	Asn	Ile	Val	Pro	Lys	Val	Asn	Tyr	
	370					375					380					
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Thr	Ile	Tyr	Asp	Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	Ala	Asn	
385					390					395					400	
ttt	aat	ggt	caa	aat	aca	gaa	att	aat	aat	atg	aat	ttt	act	aaa	cta	1248
Phe	Asn	Gly	Gln	Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu	
				405					410					415		
aaa	aat	ttt	act	gga	ttg	ttt	gaa	ttt	tat	aag	ttg	cta	tgt	gta	aga	1296
Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu	Phe	Tyr	Lys	Leu	Leu	Cys	Val	Arg	
			420					425								
													430			

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ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445	1344
gca tta aat gat tta tgt atc aaa gtt aat aat tgg gac ttg ttt ttt Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe 450 455 460	1392
agt cct tca gaa gat aat ttt act aat gat cta aat aaa gga gaa gaa Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu 465 470 475 480	1440
att aca tct gat act aat ata gaa gca gca gaa gaa aat att agt tta Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu 485 490 495	1488
gat tta ata caa caa tat tat tta acc ttt aat ttt gat aat gaa cct Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro 500 505 510	1536
gaa aat att tca ata gaa aat ctt tca agt gac att ata ggc caa tta Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu 515 520 525	1584
gaa ctt atg cct aat ata gaa aga ttt cct aat gga aaa aag tat gag Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu 530 535 540	1632
tta gat aaa tat act atg ttc cat tat ctt cgt gct caa gaa ttt gaa Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu 545 550 555 560	1680
cat ggt aaa tct agg att gct tta aca aat tct gtt aac gaa gca tta His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu 565 570 575	1728
tta aat cct agt cgt gtt tat aca ttt ttt tct tca gac tat gta aag Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys 580 585 590	1776
aaa gtt aat aaa gct acg gag gca gct atg ttt tta ggc tgg gta gaa Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu 595 600 605	1824
caa tta gta tat gat ttt acc gat gaa act agc gaa gta agt act acg Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr 610 615 620	1872
gat aaa att gcg gat ata act ata att att cca tat ata gga cct gct Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala 625 630 635 640	1920
tta aat ata ggt aat atg tta tat aaa gat gat ttt gta ggt gct tta Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu 645 650 655	1968
ata ttt tca gga gct gtt att ctg tta gaa ttt ata cca gag att gca Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala 660 665 670	2016
ata cct gta tta ggt act ttt gca ctt gta tca tat att gcg aat aag Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys 675 680 685	2064
gtt cta acc gtt caa aca ata gat aat gct tta agt aaa aga aat gaa Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu	2112

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690	695	700	
aaa tgg gat gag gtc tat	aaa tat ata gta	aca aat tgg tta gca aag	2160
Lys Trp Asp Glu Val Tyr	Lys Tyr Ile Val Thr	Asn Trp Leu Ala Lys	
705	710	715 720	
gtt aat aca cag att gat	cta ata aga aaa	aaa atg aaa gaa gct tta	2208
Val Asn Thr Gln Ile Asp	Leu Ile Arg Lys	Lys Met Lys Glu Ala Leu	
725	730	735	
gaa aat caa gca gaa gca	aca aag gct ata ata	aac tat cag tat aat	2256
Glu Asn Gln Ala Glu Ala	Thr Lys Ala Ile Ile	Asn Tyr Gln Tyr Asn	
740	745	750	
caa tat act gag gaa gag	aaa aat aat att aat	ttt aat att gat gat	2304
Gln Tyr Thr Glu Glu Glu	Lys Asn Asn Ile Asn	Phe Asn Ile Asp Asp	
755	760	765	
tta agt tcg aaa ctt aat	gag tct ata aat aaa	gct atg att aat ata	2352
Leu Ser Ser Lys Leu Asn	Glu Ser Ile Asn Lys	Ala Met Ile Asn Ile	
770	775	780	
aat aaa ttt ttg aat caa	tgc tct gtt tca tat	tta atg aat tct atg	2400
Asn Lys Phe Leu Asn Gln	Cys Ser Val Ser Tyr	Leu Met Asn Ser Met	
785	790	795 800	
atc cct tat ggt gtt aaa	cgg tta gaa gat ttt	gat gct agt ctt aaa	2448
Ile Pro Tyr Gly Val Lys	Arg Leu Glu Asp Phe	Asp Ala Ser Leu Lys	
805	810	815	
gat gca tta tta aag tat	ata tat gat aat aga	gga act tta att ggt	2496
Asp Ala Leu Leu Lys Tyr	Ile Tyr Asp Asn Arg	Gly Thr Leu Ile Gly	
820	825	830	
caa gta gat aga tta aaa	gat aaa gtt aat aat	aca ctt agt aca gat	2544
Gln Val Asp Arg Leu Lys	Asp Lys Val Asn Asn	Thr Leu Ser Thr Asp	
835	840	845	
ata cct ttt cag ctt tcc	aaa tac gta gat aat	caa aga tta tta tct	2592
Ile Pro Phe Gln Leu Ser	Lys Tyr Val Asp Asn	Gln Arg Leu Leu Ser	
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aca ttt act gaa tat att	aag		2613
Thr Phe Thr Glu Tyr Ile	Lys		
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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
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Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
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Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
435 440 445

Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
450 455 460

Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu  
465 470 475 480

Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu  
485 490 495

Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro  
500 505 510

Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
515 520 525

Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
530 535 540

Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
545 550 555 560

His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys

Gln Val Asp Arg Leu Lys Asp Lys Val Ash Asn Thr Leu Ser Thr Asp  
835 840 845



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Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
 850 855 860

Thr Phe Thr Glu Tyr Ile Lys  
 865 870

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 1 5 10 15  
 gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg 96  
 Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30  
 gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc 144  
 Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45  
 gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa 192  
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 50 55 60  
 gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca 240  
 Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80  
 gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag 288  
 Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95  
 cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc 336  
 Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110  
 cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag 384  
 Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125  
 gtt att gac act aac tgc att aac gtg atc caa cca gac ggt agc tac 432  
 Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140  
 aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att 480  
 Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160  
 atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac ctg acg 528  
 Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175  
 cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc 576  
 Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

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ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu 210 215 220	672
ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240	720
cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt ggt tta Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu 245 250 255	768
gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat gcg aag Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys 260 265 270	816
ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac tac aac Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn 275 280 285	864
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ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa gag aaa Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys 305 310 315 320	960
tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat aaa tta Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu 325 330 335	1008
aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca gag gat Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp 340 345 350	1056
aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat ttg aat Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365	1104
ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta aat tac Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380	1152
aca ata tat gat gga ttt aat tta aga aat aca aat tta gca gca aac Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400	1200
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aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt gta aga Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430	1296
ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445	1344
agc gct gat ggg gca tta aat gat tta tgt atc aaa gtt aat aat tgg Ser Ala Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp	1392

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450	455	460	
gac ttg ttt ttt agt cct tca gaa gat aat ttt act aat gat cta aat			1440
Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn			
465	470	475	480
aaa gga gaa gaa att aca tct gat act aat ata gaa gca gca gaa gaa			1488
Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu			
	485	490	495
aat att agt tta gat tta ata caa caa tat tat tta acc ttt aat ttt			1536
Asn Ile Ser Leu Asp Leu Ile Gln Tyr Tyr Leu Thr Phe Asn Phe			
	500	505	510
gat aat gaa cct gaa aat att tca ata gaa aat ctt tca agt gac att			1584
Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile			
	515	520	525
ata ggc caa tta gaa ctt atg cct aat ata gaa aga ttt cct aat gga			1632
Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly			
	530	535	540
aaa aag tat gag tta gat aaa tat act atg ttc cat tat ctt cgt gct			1680
Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala			
	545	550	555
caa gaa ttt gaa cat ggt aaa tct agg att gct tta aca aat tct gtt			1728
Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val			
	565	570	575
aac gaa gca tta tta aat cct agt cgt gtt tat aca ttt ttt tct tca			1776
Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser			
	580	585	590
gac tat gta aag aaa gtt aat aaa gct acg gag gca gct atg ttt tta			1824
Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu			
	595	600	605
ggc tgg gta gaa caa tta gta tat gat ttt acc gat gaa act agc gaa			1872
Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu			
	610	615	620
gta agt act acg gat aaa att gcg gat ata act ata att att cca tat			1920
Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr			
	625	630	635
ata gga cct gct tta aat ata ggt aat atg tta tat aaa gat gat ttt			1968
Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe			
	645	650	655
gta ggt gct tta ata ttt tca gga gct gtt att ctg tta gaa ttt ata			2016
Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile			
	660	665	670
cca gag att gca ata cct gta tta ggt act ttt gca ctt gta tca tat			2064
Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr			
	675	680	685
att gcg aat aag gtt cta acc gtt caa aca ata gat aat gct tta agt			2112
Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser			
	690	695	700
aaa aga aat gaa aaa tgg gat gag gtc tat aaa tat ata gta aca aat			2160
Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn			
	705	710	715
			720

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tgg tta gca aag gtt aat aca cag att gat cta ata aga aaa aaa atg 2208  
 Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met  
 725 730 735

aaa gaa gct tta gaa aat caa gca gaa gca aca aag gct ata ata aac 2256  
 Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn  
 740 745 750

tat cag tat aat caa tat act gag gaa gag aaa aat aat att aat ttt 2304  
 Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Lys Asn Asn Ile Asn Phe  
 755 760 765

aat att gat gat tta agt tgc aaa ctt aat gag tct ata aat aaa gct 2352  
 Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala  
 770 775 780

atg att aat ata aat aaa ttt ttg aat caa tgc tct gtt tca tat tta 2400  
 Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu  
 785 790 795 800

atg aat tct atg atc cct tat ggt gtt aaa cgg tta gaa gat ttt gat 2448  
 Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp  
 805 810 815

gct agt ctt aaa gat gca tta tta aag tat ata tat gat aat aga gga 2496  
 Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly  
 820 825 830

act tta att ggt caa gta gat aga tta aaa gat aaa gtt aat aat aca 2544  
 Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr  
 835 840 845

ctt agt aca gat ata cct ttt cag ctt tcc aaa tac gta gat aat caa 2592  
 Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln  
 850 855 860

aga tta tta tct aca ttt act gaa tat att aag taa 2628  
 Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
 865 870 875

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 <211> 875  
 <212> PRT  
 <213> Clostridium botulinum

<400> 10

Met Gln Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
 1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp

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340	345	350
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365		
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380		
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400		
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415		
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430		
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445		
Ser Ala Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp 450 455 460		
Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn 465 470 475 480		
Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu 485 490 495		
Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe 500 505 510		
Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile 515 520 525		
Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly 530 535 540		
Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala 545 550 555 560		
Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val 565 570 575		
Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser 580 585 590		
Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu 595 600 605		

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Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu  
 610 615 620

Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr  
 625 630 635 640

Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe  
 645 650 655

Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile  
 660 665 670

Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr  
 675 680 685

Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser  
 690 695 700

Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn  
 705 710 715 720

Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met  
 725 730 735

Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn  
 740 745 750

Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe  
 755 760 765

Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala  
 770 775 780

Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu  
 785 790 795 800

Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp  
 805 810 815

Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly  
 820 825 830

Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr  
 835 840 845

Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln  
 850 855 860

Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
 865 870 875

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<210> 11  
 <211> 2637  
 <212> DNA  
 <213> Clostridium botulinum

<220>  
 <221> CDS  
 <222> (1) .. (2637)

<400> 11  
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 Met Gln Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
 1 5 10 15  
 gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg 96  
 Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30  
 gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc 144  
 Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45  
 gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa 192  
 Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60  
 gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca 240  
 Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80  
 gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag 288  
 Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95  
 cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc 336  
 Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110  
 cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag 384  
 Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125  
 gtt att gac act aac tgc att aac gtg atc caa cca gac ggt agc tac 432  
 Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140  
 aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att 480  
 Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160  
 atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac ctg acg 528  
 Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175  
 cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc 576  
 Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190  
 acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg ctg ttg 624  
 Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205  
 ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag 672  
 Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu



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210	215	220	
ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240			720
cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt ggt tta Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu 245 250 255			768
gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat gcg aag Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys 260 265 270			816
ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac tac aac Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn 275 280 285			864
aag ttt aaa gat att gca agt aca ctg aac aag gct aag tcc att gtg Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val 290 295 300			912
ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa gag aaa Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys 305 310 315 320			960
tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat aaa tta Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu 325 330 335			1008
aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca gag gat Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp 340 345 350			1056
aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat ttg aat Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365			1104
ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta aat tac Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380			1152
aca ata tat gat gga ttt aat tta aga aat aca aat tta gca gca aac Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400			1200
ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act aaa cta Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415			1248
aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt gta aga Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430			1296
ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445			1344
atc gaa ggt cgt tgc gat ggg gca tta aat gat tta tgt atc aaa gtt Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val 450 455 460			1392
aat aat tgg gac ttg ttt ttt agt cct tca gaa gat aat ttt act aat Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn 465 470 475 480			1440

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gat cta aat aaa gga gaa gaa att aca tct gat act aat ata gaa gca Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala 485 490 495	1488
gca gaa gaa aat att agt tta gat tta ata caa caa tat tat tta acc Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr 500 505 510	1536
ttt aat ttt gat aat gaa cct gaa aat att tca ata gaa aat ctt tca Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser 515 520 525	1584
agt gac att ata ggc caa tta gaa ctt atg cct aat ata gaa aga ttt Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe 530 535 540	1632
cct aat gga aaa aag tat gag tta gat aaa tat act atg ttc cat tat Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr 545 550 555 560	1680
ctt cgt gct caa gaa ttt gaa cat ggt aaa tct agg att gct tta aca Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr 565 570 575	1728
aat tct gtt aac gaa gca tta tta aat cct agt cgt gtt tat aca ttt Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe 580 585 590	1776
ttt tct tca gac tat gta aag aaa gtt aat aaa gct acg gag gca gct Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala 595 600 605	1824
atg ttt tta ggc tgg gta gaa caa tta gta tat gat ttt acc gat gaa Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu 610 615 620	1872
act agc gaa gta agt act acg gat aaa att gcg gat ata act ata att Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile 625 630 635 640	1920
att cca tat ata gga cct gct tta aat ata ggt aat atg tta tat aaa Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys 645 650 655	1968
gat gat ttt gta ggt gct tta ata ttt tca gga gct gtt att ctg tta Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu 660 665 670	2016
gaa ttt ata cca gag att gca ata cct gta tta ggt act ttt gca ctt Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu 675 680 685	2064
gta tca tat att gcg aat aag gtt cta acc gtt caa aca ata gat aat Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn 690 695 700	2112
gct tta agt aaa aga aat gaa aaa tgg gat gag gtc tat aaa tat ata Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile 705 710 715 720	2160
gta aca aat tgg tta gca aag gtt aat aca cag att gat cta ata aga Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg 725 730 735	2208
aaa aaa atg aaa gaa gct tta gaa aat caa gca gaa gca aca aag gct Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala	2256

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740	745	750	
ata ata aac tat cag tat aat caa tat act gag gaa gag aaa aat aat Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn 755 760 765			2304
att aat ttt aat att gat gat tta agt tcg aaa ctt aat gag tct ata Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile 770 775 780			2352
aat aaa gct atg att aat ata aat aaa ttt ttg aat caa tgc tct gtt Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val 785 790 795 800			2400
tca tat tta atg aat tct atg atc cct tat ggt gtt aaa cgg tta gaa Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu 805 810 815			2448
gat ttt gat gct agt ctt aaa gat gca tta tta aag tat ata tat gat Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp 820 825 830			2496
aat aga gga act tta att ggt caa gta gat aga tta aaa gat aaa gtt Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val 835 840 845			2544
aat aat aca ctt agt aca gat ata cct ttt cag ctt tcc aaa tac gta Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val 850 855 860			2592
gat aat caa aga tta tta tct aca ttt act gaa tat att aag taa Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys 865 870 875			2637

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 <211> 878  
 <212> PRT  
 <213> Clostridium botulinum

<400> 12

Met Gln Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

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Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
 435 440 445

Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val  
 450 455 460

Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn  
 465 470 475 480

Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala  
 485 490 495

Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr  
 500 505 510

Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser  
 515 520 525

Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe  
 530 535 540

Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr  
 545 550 555 560

Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr  
 565 570 575

Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe  
 580 585 590

Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala  
 595 600 605

Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu  
 610 615 620

Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile

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625                      630                      635                      640  
 Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys  
                          645                      650                      655  
 Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu  
                          660                      665                      670  
 Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu  
                          675                      680                      685  
 Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn  
                          690                      695                      700  
 Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile  
                          705                      710                      715                      720  
 Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg  
                          725                      730                      735  
 Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala  
                          740                      745                      750  
 Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn  
                          755                      760                      765  
 Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile  
                          770                      775                      780  
 Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val  
                          785                      790                      795                      800  
 Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu  
                          805                      810                      815  
 Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp  
                          820                      825                      830  
 Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val  
                          835                      840                      845  
 Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val  
                          850                      855                      860  
 Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
                          865                      870                      875

<210> 13  
 <211> 2862  
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&lt;213&gt; Clostridium botulinum

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1) .. (2862)

&lt;400&gt; 13

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Met Gln Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly	
1 5 10 15	
ggt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg	96
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro	
20 25 30	
gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc	144
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg	
35 40 45	
gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa	192
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu	
50 55 60	
gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca	240
Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr	
65 70 75 80	
gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag	288
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu	
85 90 95	
cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc	336
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val	
100 105 110	
cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag	384
Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys	
115 120 125	
ggt att gac act aac tgc att aac gtg atc caa cca gac ggt agc tac	432
Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr	
130 135 140	
aga tct gaa gaa ctt aac ctg gta atc atc ggg ccc tcc gcg gac att	480
Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile	
145 150 155 160	
atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac ctg acg	528
Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr	
165 170 175	
cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc	576
Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe	
180 185 190	
acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg ctg ttg	624
Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu	
195 200 205	
ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag	672
Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu	
210 215 220	
ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac	720
Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn	

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225	230	235	240	
cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt ggt tta				768
Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu	245	250	255	
gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat gcg aag				816
Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys	260	265	270	
ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac tac aac				864
Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn	275	280	285	
aag ttt aaa gat att gca agt aca ctg aac aag gct aag tcc att gtg				912
Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val	290	295	300	
ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa gag aaa				960
Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys	305	310	315	320
tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat aaa tta				1008
Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu	325	330	335	
aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca gag gat				1056
Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp	340	345	350	
aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat ttg aat				1104
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn	355	360	365	
ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta aat tac				1152
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr	370	375	380	
aca ata tat gat gga ttt aat tta aga aat aca aat tta gca gca aac				1200
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn	385	390	395	400
ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act aaa cta				1248
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu	405	410	415	
aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt gta aga				1296
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg	420	425	430	
ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag				1344
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys	435	440	445	
atc gaa ggt cgt tgc gat ggg gca tta aat gat tta tgt atc aaa gtt				1392
Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val	450	455	460	
aat aat tgg gac ttg ttt ttt agt cct tca gaa gat aat ttt act aat				1440
Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn	465	470	475	480
gat cta aat aaa gga gaa gaa att aca tct gat act aat ata gaa gca				1488
Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala	485	490	495	



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gca gaa gaa aat att agt tta gat tta ata caa caa tat tat tta acc Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr 500 505 510	1536
ttt aat ttt gat aat gaa cct gaa aat att tca ata gaa aat ctt tca Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser 515 520 525	1584
agt gac att ata ggc caa tta gaa ctt atg cct aat ata gaa aga ttt Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe 530 535 540	1632
cct aat gga aaa aag tat gag tta gat aaa tat act atg ttc cat tat Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr 545 550 555 560	1680
ctt cgt gct caa gaa ttt gaa cat ggt aaa tct agg att gct tta aca Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr 565 570 575	1728
aat tct gtt aac gaa gca tta tta aat cct agt cgt gtt tat aca ttt Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe 580 585 590	1776
ttt tct tca gac tat gta aag aaa gtt aat aaa gct acg gag gca gct Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala 595 600 605	1824
atg ttt tta ggc tgg gta gaa caa tta gta tat gat ttt acc gat gaa Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu 610 615 620	1872
act agc gaa gta agt act acg gat aaa att gcg gat ata act ata att Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile 625 630 635 640	1920
att cca tat ata gga cct gct tta aat ata ggt aat atg tta tat aaa Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys 645 650 655	1968
gat gat ttt gta ggt gct tta ata ttt tca gga gct gtt att ctg tta Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu 660 665 670	2016
gaa ttt ata cca gag att gca ata cct gta tta ggt act ttt gca ctt Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu 675 680 685	2064
gta tca tat att gcg aat aag gtt cta acc gtt caa aca ata gat aat Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn 690 695 700	2112
gct tta agt aaa aga aat gaa aaa tgg gat gag gtc tat aaa tat ata Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile 705 710 715 720	2160
gta aca aat tgg tta gca aag gtt aat aca cag att gat cta ata aga Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg 725 730 735	2208
aaa aaa atg aaa gaa gct tta gaa aat caa gca gaa gca aca aag gct Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala 740 745 750	2256
ata ata aac tat cag tat aat caa tat act gag gaa gag aaa aat aat Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn	2304

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755	760	765	
att aat ttt aat att gat gat tta agt tcg aaa ctt aat gag tct ata Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile 770 775 780			2352
aat aaa gct atg att aat ata aat aaa ttt ttg aat caa tgc tct gtt Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val 785 790 795 800			2400
tca tat tta atg aat tct atg atc cct tat ggt gtt aaa cgg tta gaa Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu 805 810 815			2448
gat ttt gat gct agt ctt aaa gat gca tta tta aag tat ata tat gat Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp 820 825 830			2496
aat aga gga act tta att ggt caa gta gat aga tta aaa gat aaa gtt Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val 835 840 845			2544
aat aat aca ctt agt aca gat ata cct ttt cag ctt tcc aaa tac gta Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val 850 855 860			2592
gat aat caa aga tta tta tct aca ttt act gaa tat att aag tct agg Asp Asn Gln Arg Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ser Arg 865 870 875 880			2640
cct gga ccg gag acg ctc tgc ggg gct gag ctg gtg gat gct ctt cag Pro Gly Pro Glu Thr Leu Cys Gly Ala Glu Leu Val Asp Ala Leu Gln 885 890 895			2688
ttc gtg tgt gga gac agg ggc ttt tat ttc aac aag ccc aca ggg tat Phe Val Cys Gly Asp Arg Gly Phe Tyr Phe Asn Lys Pro Thr Gly Tyr 900 905 910			2736
ggc tcc agc agt cgg agg gcg cct cag aca ggt atc gtg gat gag tgc Gly Ser Ser Ser Arg Arg Ala Pro Gln Thr Gly Ile Val Asp Glu Cys 915 920 925			2784
tgc ttc cgg agc tgt gat cta agg agg ctg gag atg tat tgc gca ccc Cys Phe Arg Ser Cys Asp Leu Arg Arg Leu Glu Met Tyr Cys Ala Pro 930 935 940			2832
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 <212> PRT  
 <213> Clostridium botulinum

<400> 14

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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

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Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
435 440 445

Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val  
450 455 460

Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn  
465 470 475 480

Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala  
485 490 495

Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr  
500 505 510

Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser  
515 520 525

Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe  
530 535 540

Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr  
545 550 555 560

Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr

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	565		570		575
Asn Ser Val	Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe				
	580		585		590
Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala					
	595		600		605
Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu					
	610		615		620
Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile					
	625		630		640
Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys					
	645		650		655
Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu					
	660		665		670
Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu					
	675		680		685
Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn					
	690		695		700
Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile					
	705		710		715
Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg					
	725		730		735
Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala					
	740		745		750
Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn					
	755		760		765
Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile					
	770		775		780
Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val					
	785		790		795
Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu					
	805		810		815
Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp					
	820		825		830

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Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val  
 835 840 845

Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val  
 850 855 860

Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ser Arg  
 865 870 875 880

Pro Gly Pro Glu Thr Leu Cys Gly Ala Glu Leu Val Asp Ala Leu Gln  
 885 890 895

Phe Val Cys Gly Asp Arg Gly Phe Tyr Phe Asn Lys Pro Thr Gly Tyr  
 900 905 910

Gly Ser Ser Ser Arg Arg Ala Pro Gln Thr Gly Ile Val Asp Glu Cys  
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Cys Phe Arg Ser Cys Asp Leu Arg Arg Leu Glu Met Tyr Cys Ala Pro  
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Leu Lys Pro Ala Lys Ser Ala Glu Ala  
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 1 5 10 15  
 gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg 96  
 Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30  
 gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc 144  
 Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45  
 gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa 192  
 Asp Thr Phe Thr Asn Pro Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60  
 gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca 240  
 Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80  
 gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag 288  
 Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

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cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val 100 105 110	336
cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys 115 120 125	384
gtt att gac act aac tgc att aac gtg atc caa cca gac ggt agc tac Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr 130 135 140	432
aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile 145 150 155 160	480
atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac ctg acg Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr 165 170 175	528
cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe 180 185 190	576
acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg ctg ttg Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu 195 200 205	624
ggg gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu 210 215 220	672
ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240	720
cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt ggt tta Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu 245 250 255	768
gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat gcg aag Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys 260 265 270	816
ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac tac aac Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn 275 280 285	864
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ggg acc act gct tca tta cag tat atg aaa aat gtt ttt aaa gag aaa Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys 305 310 315 320	960
tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat aaa tta Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu 325 330 335	1008
aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca gag gat Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp 340 345 350	1056
aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat ttg aat Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn	1104

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aca ata tat gat gga ttt aat tta aga aat aca aat tta gca gca aac Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400			1200
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aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt gta aga Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430			1296
ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445			1344
atc gaa ggt cgt tgc gat ggg gca tta aat gat tta tgt atc aaa gtt Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val 450 455 460			1392
aat aat tgg gac ttg ttt ttt agt cct tca gaa gat aat ttt act aat Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn 465 470 475 480			1440
gat cta aat aaa gga gaa gaa att aca tct gat act aat ata gaa gca Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala 485 490 495			1488
gca gaa gaa aat att agt tta gat tta ata caa caa tat tat tta acc Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr 500 505 510			1536
ttt aat ttt gat aat gaa cct gaa aat att tca ata gaa aat ctt tca Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser 515 520 525			1584
agt gac att ata ggc caa tta gaa ctt atg cct aat ata gaa aga ttt Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe 530 535 540			1632
cct aat gga aaa aag tat gag tta gat aaa tat act atg ttc cat tat Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr 545 550 555 560			1680
ctt cgt gct caa gaa ttt gaa cat ggt aaa tct agg att gct tta aca Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr 565 570 575			1728
aat tct gtt aac gaa gca tta tta aat cct agt cgt gtt tat aca ttt Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe 580 585 590			1776
ttt tct tca gac tat gta aag aaa gtt aat aaa gct acg gag gca gct Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala 595 600 605			1824
atg ttt tta ggc tgg gta gaa caa tta gta tat gat ttt acc gat gaa Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu 610 615 620			1872



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act agc gaa gta agt act acg gat aaa att gcg gat ata act ata att Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile 625 630 635 640	1920
att cca tat ata gga cct gct tta aat ata ggt aat atg tta tat aaa Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys 645 650 655	1968
gat gat ttt gta ggt gct tta ata ttt tca gga gct gtt att ctg tta Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu 660 665 670	2016
gaa ttt ata cca gag att gca ata cct gta tta ggt act ttt gca ctt Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu 675 680 685	2064
gta tca tat att gcg aat aag gtt cta acc gtt caa aca ata gat aat Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn 690 695 700	2112
gct tta agt aaa aga aat gaa aaa tgg gat gag gtc tat aaa tat ata Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile 705 710 715 720	2160
gta aca aat tgg tta gca aag gtt aat aca cag att gat cta ata aga Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg 725 730 735	2208
aaa aaa atg aaa gaa gct tta gaa aat caa gca gaa gca aca aag gct Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala 740 745 750	2256
ata ata aac tat cag tat aat caa tat act gag gaa gag aaa aat aat Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Lys Lys Asn Asn 755 760 765	2304
att aat ttt aat att gat gat tta agt tcg aaa ctt aat gag tct ata Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile 770 775 780	2352
aat aaa gct atg att aat ata aat aaa ttt ttg aat caa tgc tct gtt Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val 785 790 795 800	2400
tca tat tta atg aat tct atg atc cct tat ggt gtt aaa cgg tta gaa Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu 805 810 815	2448
gat ttt gat gct agt ctt aaa gat gca tta tta aag tat ata tat gat Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp 820 825 830	2496
aat aga gga act tta att ggt caa gta gat aga tta aaa gat aaa gtt Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val 835 840 845	2544
aat aat aca ctt agt aca gat ata cct ttt cag ctt tcc aaa tac gta Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val 850 855 860	2592
gat aat caa aga tta tta tct aca ttt act gaa tat att aag tct agg Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ser Arg 865 870 875 880	2640
cct caa tct aaa gtt aaa aga caa ata ttt tca ggc tat caa tct gat Pro Gln Ser Lys Val Lys Arg Gln Ile Phe Ser Gly Tyr Gln Ser Asp 885 890 895 900	2688

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885

890

895

2724

att gat aca cat aat aga att aag gat gaa tta tga  
 ile asp thr his asn arg ile lys asp glu leu  
 900 905

&lt;210&gt; 16

&lt;211&gt; 907

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 16

Met Gln Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

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Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
 435 440 445

Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val  
 450 455 460

Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn  
 465 470 475 480

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Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala  
 485 490 495

Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr  
 500 505 510

Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser  
 515 520 525

Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe  
 530 535 540

Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr  
 545 550 555 560

Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr  
 565 570 575

Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe  
 580 585 590

Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala  
 595 600 605

Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu  
 610 615 620

Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile  
 625 630 635 640

Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys  
 645 650 655

Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu  
 660 665 670

Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu  
 675 680 685

Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn  
 690 695 700

Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile  
 705 710 715 720

Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg  
 725 730 735

Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala

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740	745	750
Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn 755 760 765		
Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile 770 775 780		
Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val 785 790 795 800		
Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu 805 810 815		
Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp 820 825 830		
Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val 835 840 845		
Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val 850 855 860		
Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ser Arg 865 870 875 880		
Pro Gln Ser Lys Val Lys Arg Gln Ile Phe Ser Gly Tyr Gln Ser Asp 885 890 895		
Ile Asp Thr His Asn Arg Ile Lys Asp Glu Leu 900 905		

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1 5 10 15	
ggt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg	96
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro	
20 25 30	
gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc	144
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg	
35 40 45	

gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu 50 55 60	192
gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr 65 70 75 80	240
gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu 85 90 95	288
cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val 100 105 110	336
cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys 115 120 125	384
gtt att gac act aac tgc att aac gtg atc caa cca gac ggt agc tac Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr 130 135 140	432
aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile 145 150 155 160	480
atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac ctg acg Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr 165 170 175	528
cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe 180 185 190	576
acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg ctg ttg Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu 195 200 205	624
ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu 210 215 220	672
ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240	720
cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt ggt tta Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu 245 250 255	768
gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat gcg aag Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys 260 265 270	816
ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac tac aac Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn 275 280 285	864
aag ttt aaa gat att gca agt aca ctg aac aag gct aag tcc att gtg Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val 290 295 300	912
ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa gag aaa Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys 300	960

305	310	315	320	
tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat aaa tta				1008
Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu	325	330	335	
aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca gag gat				1056
Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp	340	345	350	
aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat ttg aat				1104
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn	355	360	365	
ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta aat tac				1152
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr	370	375	380	
aca ata tat gat gga ttt aat tta aga aat aca aat tta gca gca aac				1200
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn	385	390	395	400
ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act aaa cta				1248
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu	405	410	415	
aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt gta aga				1296
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg	420	425	430	
ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag				1344
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys	435	440	445	
atc gaa ggt cgt tgc gat ggg gca tta aat gat tta tgt atc aaa gtt				1392
Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val	450	455	460	
aat aat tgg gac ttg ttt ttt agt cct tca gaa gat aat ttt act aat				1440
Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn	465	470	475	480
gat cta aat aaa gga gaa gaa att aca tct gat act aat ata gaa gca				1488
Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala	485	490	495	
gca gaa gaa aat att agt tta gat tta ata caa caa tat tat tta acc				1536
Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr	500	505	510	
ttt aat ttt gat aat gaa cct gaa aat att tca ata gaa aat ctt tca				1584
Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser	515	520	525	
agt gac att ata ggc caa tta gaa ctt atg cct aat ata gaa aga ttt				1632
Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe	530	535	540	
cct aat gga aaa aag tat gag tta gat aaa tat act atg ttc cat tat				1680
Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr	545	550	555	560
ctt cgt gct caa gaa ttt gaa cat ggt aaa tct agg att gct tta aca				1728
Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr	565	570	575	

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aat tct gtt aac gaa gca tta tta aat cct agt cgt gtt tat aca ttt Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe 580 585 590	1776
ttt tct tca gac tat gta aag aaa gtt aat aaa gct acg gag gca gct Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala 595 600 605	1824
atg ttt tta ggc tgg gta gaa caa tta gta tat gat ttt acc gat gaa Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu 610 615 620	1872
act agc gaa gta agt act acg gat aaa att gcg gat ata act ata att Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile 625 630 635 640	1920
att cca tat ata gga cct gct tta aat ata ggt aat atg tta tat aaa Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys 645 650 655	1968
gat gat ttt gta ggt gct tta ata ttt tca gga gct gtt att ctg tta Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu 660 665 670	2016
gaa ttt ata cca gag att gca ata cct gta tta ggt act ttt gca ctt Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu 675 680 685	2064
gta tca tat att gcg aat aag gtt cta acc gtt caa aca ata gat aat Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn 690 695 700	2112
gct tta agt aaa aga aat gaa aaa tgg gat gag gtc tat aaa tat ata Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile 705 710 715 720	2160
gta aca aat tgg tta gca aag gtt aat aca cag att gat cta ata aga Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg 725 730 735	2208
aaa aaa atg aaa gaa gct tta gaa aat caa gca gaa gca aca aag gct Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala 740 745 750	2256
ata ata aac tat cag tat aat caa tat act gag gaa gag aaa aat aat Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn 755 760 765	2304
att aat ttt aat att gat gat tta agt tcg aaa ctt aat gag tct ata Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile 770 775 780	2352
aat aaa gct atg att aat ata aat aaa ttt ttg aat caa tgc tct gtt Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val 785 790 795 800	2400
tca tat tta atg aat tct atg atc cct tat ggt gtt aaa cgg tta gaa Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu 805 810 815	2448
gat ttt gat gct agt ctt aaa gat gca tta tta aag tat ata tat gat Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp 820 825 830	2496
aat aga gga act tta att ggt caa gta gat aga tta aaa gat aaa gtt Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val	2544



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835					840					845					
aat aat aca ctt agt aca gat ata cct ttt cag ctt tcc aaa tac gta														2592	
Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val															
850						855					860				
gat aat caa aga tta tta tct aca ttt act gaa tat att aag tca ggc														2640	
Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ser Gly															
865					870				875				880		
ctg aat tcc ccg ggt gca gct cat tat gcg caa cac gat gaa gcc gta														2688	
Leu Asn Ser Pro Gly Ala Ala His Tyr Ala Gln His Asp Glu Ala Val															
				885				890					895		
gac aac aaa ttc aac aaa gaa caa caa aac gcg ttc tat gag atc tta														2736	
Asp Asn Lys Phe Asn Lys Glu Gln Gln Asn Ala Phe Tyr Glu Ile Leu															
			900				905						910		
cat tta cct aac tta aac gaa gaa caa cga aac gcc ttc atc caa agt														2784	
His Leu Pro Asn Leu Asn Glu Glu Gln Arg Asn Ala Phe Ile Gln Ser															
			915				920						925		
tta aaa gat gac cca agc caa agc gct aac ctt tta gca gaa gct aaa														2832	
Leu Lys Asp Asp Pro Ser Gln Ser Ala Asn Leu Leu Ala Glu Ala Lys															
			930				935						940		
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Lys Leu Asn Asp Ala Gln Ala Pro Lys Val Asp Asn Lys Phe Asn Lys															
			945			950			955				960		
gaa caa caa aac gcg ttc tat gag atc tta cat tta cct aac tta aac														2928	
Glu Gln Gln Asn Ala Phe Tyr Glu Ile Leu His Leu Pro Asn Leu Asn															
				965				970					975		
gaa gaa caa cga aac gcc ttc atc caa agt tta aaa gat gac cca agc														2976	
Glu Glu Gln Arg Asn Ala Phe Ile Gln Ser Leu Lys Asp Asp Pro Ser															
			980				985						990		
caa agc gct aac ctt tta gca gaa gct aaa aag cta aat gat gct cag														3024	
Gln Ser Ala Asn Leu Leu Ala Glu Ala Lys Lys Leu Asn Asp Ala Gln															
			995				1000						1005		
gcg ccg aaa gta gac tag														3042	
Ala Pro Lys Val Asp															
1010															

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 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

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Asp Thr Phe Thr Asn Pro Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
 435 440 445

Ile Glu Gly Arg Cys Asp Gly Ala Leu Asn Asp Leu Cys Ile Lys Val  
 450 455 460

Asn Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn  
 465 470 475 480

Asp Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala  
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Ala Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr  
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Phe Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser  
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Ser Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe  
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Pro Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr  
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Leu Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr  
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Asn Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe

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580

585

590

Phe Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala  
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Met Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu  
 610 615 620

Thr Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile  
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Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys  
 645 650 655

Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu  
 660 665 670

Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu  
 675 680 685

Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn  
 690 695 700

Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile  
 705 710 715 720

Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg  
 725 730 735

Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala  
 740 745 750

Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn  
 755 760 765

Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile  
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Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val  
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Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu  
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Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp  
 820 825 830

Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val  
 835 840 845

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Leu Asn Ser Pro Gly Ala Ala His Tyr Ala Gln His Asp Glu Ala Val  
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Asp Asn Lys Phe Asn Lys Glu Gln Gln Asn Ala Phe Tyr Glu Ile Leu  
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His Leu Pro Asn Leu Asn Glu Glu Gln Arg Asn Ala Phe Ile Gln Ser  
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Leu Lys Asp Asp Pro Ser Gln Ser Ala Asn Leu Leu Ala Glu Ala Lys  
 930 935 940

Lys Leu Asn Asp Ala Gln Ala Pro Lys Val Asp Asn Lys Phe Asn Lys  
 945 950 955 960

Glu Gln Gln Asn Ala Phe Tyr Glu Ile Leu His Leu Pro Asn Leu Asn  
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Glu Glu Gln Arg Asn Ala Phe Ile Gln Ser Leu Lys Asp Asp Pro Ser  
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 1 5 10 15  
 aat aat att att atg atg gag cct cca ttt gcg aga ggt acg ggg aga 96  
 Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg  
 20 25 30  
 tat tat aaa gct ttt aaa atc aca gat cgt att tgg ata ata ccg gaa 144  
 Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
 35 40 45

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aga tat act ttt gga tat aaa cct gag gat ttt aat aaa agt tcc ggt	192
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly	
50 55 60	
att ttt aat aga gat gtt tgt gaa tat tat gat cca gat tac tta aat	240
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn	
65 70 75 80	
act aat gat aaa aag aat ata ttt tta caa aca atg atc aag tta ttt	288
Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe	
85 90 95	
aat aga atc aaa tca aaa cca ttg ggt gaa aag tta tta gag atg att	336
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile	
100 105 110	
ata aat ggt ata cct tat ctt gga gat aga cgt gtt cca ctc gaa gag	384
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu	
115 120 125	
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Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn	
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cca gga gaa gtg gag cga aaa aaa ggt att ttc gca aat tta ata ata	480
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile	
145 150 155 160	
ttt gga cct ggg cca gtt tta aat gaa aat gag act ata gat ata ggt	528
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly	
165 170 175	
ata caa aat cat ttt gca tca agg gaa ggc ttc ggg ggt ata atg caa	576
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln	
180 185 190	
atg aag ttt tgc cca gaa tat gta agc gta ttt aat aat gtt caa gaa	624
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu	
195 200 205	
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Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro	
210 215 220	
gcc ttg ata tta atg cat gaa ctt ata cat gtt tta cat gga tta tat	720
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr	
225 230 235 240	
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Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe	
245 250 255	
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Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe	
260 265 270	
gga gga caa gat ccc agc atc ata act cct tct acg gat aaa agt atc	864
Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile	
275 280 285	
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Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn	
290 295 300	
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Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr	

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305	310	315	320	
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	325	330	335	
aaa tat agt ata Lys Tyr Ser Ile	gat gta gaa agt Asp Val Glu Ser	ttt gat aaa tta Phe Asp Lys Leu	tat aaa agc tta Tyr Lys Ser Leu	1056
	340	345	350	
atg ttt ggt ttt Met Phe Gly Phe	aca gaa act aat Thr Glu Thr Asn	ata gca gaa aat Ile Ala Glu Asn	tat aaa ata aaa Tyr Lys Ile Lys	1104
	355	360	365	
act aga gct tct Thr Arg Ala Ser	tat ttt agt gat Tyr Phe Ser Asp	tcc tta cca cca Ser Leu Pro Val	gta aaa ata aaa Lys Ile Lys	1152
	370	375	380	
aat tta tta gat Asn Leu Leu Asp	aat gaa atc tat Asn Glu Ile Tyr	act ata gag gaa Thr Ile Glu Glu	ggg ttt aat ata Gly Phe Asn Ile	1200
	385	390	395	400
tct gat aaa gat Ser Asp Lys Asp	atg gaa aaa gaa Met Glu Lys Glu	tat aga ggt cag Tyr Arg Gly Gln	aat aaa gct ata Asn Lys Ala Ile	1248
	405	410	415	
aat aaa caa gct Asn Lys Gln Ala	tat gaa gaa att Tyr Glu Glu Ile	agc aag gag cat Ser Lys Glu His	ttg gct gta tat Leu Ala Val Tyr	1296
	420	425	430	
aag ata caa atg Lys Ile Gln Met	tgt aaa agt gtt Cys Lys Ser Val	aaa gct cca gga Lys Ala Pro Gly	ata tgt att gat Ile Cys Ile Asp	1344
	435	440	445	
gtt gat aat gaa Val Asp Asn Glu	gat ttg ttc ttt Asp Leu Phe Phe	ata gct gat aaa Ile Ala Asp Lys	aat agt ttt tca Asn Ser Phe Ser	1392
	450	455	460	
gat gat tta tct Asp Asp Leu Ser	aaa aac gaa aga Lys Asn Glu Arg	ata gaa tat aat Ile Glu Tyr Asn	aca cag agt aat Thr Gln Ser Asn	1440
	465	470	475	480
tat ata gaa aat Tyr Ile Glu Asn	gac ttc cct ata Asp Phe Pro Ile	aat gaa tta att Asn Glu Leu Ile	tta gat act gat Leu Asp Thr Asp	1488
	485	490	495	
tta ata agt aaa Leu Ile Ser Lys	ata gaa tta cca Ile Glu Leu Pro	agt gaa aat aca Ser Glu Asn Thr	gaa tca ctt act Glu Ser Leu Thr	1536
	500	505	510	
gat ttt aat gta Asp Phe Asn Val	gat gtt cca gta Asp Val Pro Val	tat gaa aaa caa Tyr Glu Lys Gln	ccc gct ata aaa Pro Ala Ile Lys	1584
	515	520	525	
aaa att ttt aca Lys Ile Phe Thr	gat gaa aat acc Asp Glu Asn Thr	atc ttt caa tat Ile Phe Gln Tyr	tta tac tct cag Leu Tyr Ser Gln	1632
	530	535	540	
aca ttt cct cta Thr Phe Pro Leu	gat ata aga gat Asp Ile Arg Asp	ata agt tta aca Ile Ser Leu Thr	tct tca ttt gat Ser Ser Phe Asp	1680
	545	550	555	560
gat gca tta tta Asp Ala Leu Leu	ttt tct aac aaa Phe Ser Asn Lys	gtt tat tca ttt Val Tyr Ser Phe	ttt tct atg gat Phe Ser Met Asp	1728
	565	570	575	

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tat att aaa act gct aat aaa gtg gta gaa gca gga tta ttt gca ggt	1776
Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly	
580 585 590	
tgg gtg aaa cag ata gta aat gat ttt gta atc gaa gct aat aaa agc	1824
Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser	
595 600 605	
aat act atg gat aaa att gca gat ata tct cta att gtt cct tat ata	1872
Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile	
610 615 620	
gga tta gct tta aat gta gga aat gaa aca gct aaa gga aat ttt gaa	1920
Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu	
625 630 635 640	
aat gct ttt gag att gca gga gcc agt att cta cta gaa ttt ata cca	1968
Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro	
645 650 655	
gaa ctt tta ata cct gta gtt gga gcc ttt tta tta gaa tca tat att	2016
Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile	
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gac aat aaa aat aaa att att aaa aca ata gat aat gct tta act aaa	2064
Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys	
675 680 685	
aga aat gaa aaa tgg agt gat atg tac gga tta ata gta gcg caa tgg	2112
Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp	
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Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr	
705 710 715 720	
aag gct tta aat tat caa gca caa gca ttg gaa gaa ata ata aaa tac	2208
Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr	
725 730 735	
aga tat aat ata tat tct gaa aaa gaa aag tca aat att aac atc gat	2256
Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp	
740 745 750	
ttt aat gat ata aat tct aaa ctt aat gag ggt att aac caa gct ata	2304
Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile	
755 760 765	
gat aat ata aat aat ttt ata aat gga tgt tct gta tca tat tta atg	2352
Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met	
770 775 780	
aaa aaa atg att cca tta gct gta gaa aaa tta cta gac ttt gat aat	2400
Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn	
785 790 795 800	
act ctc aaa aaa aat ttg tta aat tat ata gat gaa aat aaa tta tat	2448
Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr	
805 810 815	
ttg att gga agt gca gaa tat gaa aaa tca aaa gta aat aaa tac ttg	2496
Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu	
820 825 830	
aaa acc att atg ccg ttt gat ctt tca ata tat acc aat gat aca ata	2544
Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile	



835	840	845	
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atc tta aat tta aga tat aag gat aat aat tta ata gat tta tca gga Ile Leu Asn Leu Arg Tyr Lys Asp Asn Asn Leu Ile Asp Leu Ser Gly 865 870 875 880			2640
tat ggg gca aag gta gag gta tat gat gga gtc gag ctt aat gat aaa Tyr Gly Ala Lys Val Glu Val Tyr Asp Gly Val Glu Leu Asn Asp Lys 885 890 895			2688
aat caa ttt aaa tta act agt tca gca aat agt aag att aga gtg act Asn Gln Phe Lys Leu Thr Ser Ser Ala Asn Ser Lys Ile Arg Val Thr 900 905 910			2736
caa aat cag aat atc ata ttt aat agt gtg ttc ctt gat ttt agc gtt Gln Asn Gln Asn Ile Ile Phe Asn Ser Val Phe Leu Asp Phe Ser Val 915 920 925			2784
agc ttt tgg ata aga ata cct aaa tat aag aat gat ggt ata caa aat Ser Phe Trp Ile Arg Ile Pro Lys Tyr Lys Asn Asp Gly Ile Gln Asn 930 935 940			2832
tat att cat aat gaa tat aca ata att aat tgt atg aaa aat aat tcg Tyr Ile His Asn Glu Tyr Thr Ile Ile Asn Cys Met Lys Asn Asn Ser 945 950 955 960			2880
ggc tgg aaa ata tct att agg ggt aat agg ata ata tgg act tta att Gly Trp Lys Ile Ser Ile Arg Gly Asn Arg Ile Ile Trp Thr Leu Ile 965 970 975			2928
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tca aat aca gat att aaa gat ata aga gaa gtt att gct aat ggt Ser Asn Thr Asp Ile Lys Asp Ile Arg Glu Val Ile Ala Asn Gly 1025 1030 1035			3114
gaa ata ata ttt aaa tta gat ggt gat ata gat aga aca caa ttt Glu Ile Ile Phe Lys Leu Asp Gly Asp Ile Asp Arg Thr Gln Phe 1040 1045 1050			3159
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 1100 1105 1110  
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 1115 1120 1125  
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 Gln Asn Ser Lys Tyr Ile Asn Tyr Arg Asp Leu Tyr Ile Gly Glu  
 1130 1135 1140  
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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
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Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
50 55 60

Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
65 70 75 80

Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe  
85 90 95

Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
100 105 110

Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
115 120 125

Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
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Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
145 150 155 160

Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
 165 170 175

Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
 180 185 190

Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
 195 200 205

Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
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Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255

Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
 260 265 270

Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
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Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
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Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
 325 330 335

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
 340 345 350

Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
 355 360 365

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
 370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
 385 390 395 400

Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
 405 410 415

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr

420	425	430
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Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser 450 455 460		
Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn 465 470 475 480		
Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp 485 490 495		
Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr 500 505 510		
Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys 515 520 525		
Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln 530 535 540		
Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp 545 550 555 560		
Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp 565 570 575		
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Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser 595 600 605		
Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile 610 615 620		
Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu 625 630 635 640		
Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro 645 650 655		
Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile 660 665 670		
Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys 675 680 685		

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Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp  
690 695 700

Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr  
705 710 715 720

Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr  
725 730 735

Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp  
740 745 750

Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile  
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Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn  
785 790 795 800

Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr  
805 810 815

Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu  
820 825 830

Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile  
835 840 845

Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser Glu Ile Leu Asn Asn Ile  
850 855 860

Ile Leu Asn Leu Arg Tyr Lys Asp Asn Asn Leu Ile Asp Leu Ser Gly  
865 870 875 880

Tyr Gly Ala Lys Val Glu Val Tyr Asp Gly Val Glu Leu Asn Asp Lys  
885 890 895

Asn Gln Phe Lys Leu Thr Ser Ser Ala Asn Ser Lys Ile Arg Val Thr  
900 905 910

Gln Asn Gln Asn Ile Ile Phe Asn Ser Val Phe Leu Asp Phe Ser Val  
915 920 925

Ser Phe Trp Ile Arg Ile Pro Lys Tyr Lys Asn Asp Gly Ile Gln Asn  
930 935 940

Tyr Ile His Asn Glu Tyr Thr Ile Ile Asn Cys Met Lys Asn Asn Ser  
945 950 955 960

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Gly Trp Lys Ile Ser Ile Arg Gly Asn Arg Ile Ile Trp Thr Leu Ile  
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Asp Ile Asn Gly Lys Thr Lys Ser Val Phe Phe Glu Tyr Asn Ile Arg  
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Glu Asp Ile Ser Glu Tyr Ile Asn Arg Trp Phe Phe Val Thr Ile Thr  
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Asn Asn Leu Asn Asn Ala Lys Ile Tyr Ile Asn Gly Lys Leu Glu  
                   1010                                  1015                                  1020

Ser Asn Thr Asp Ile Lys Asp Ile Arg Glu Val Ile Ala Asn Gly  
                   1025                                  1030                                  1035

Glu Ile Ile Phe Lys Leu Asp Gly Asp Ile Asp Arg Thr Gln Phe  
                   1040                                  1045                                  1050

Ile Trp Met Lys Tyr Phe Ser Ile Phe Asn Thr Glu Leu Ser Gln  
                   1055                                  1060                                  1065

Ser Asn Ile Glu Glu Arg Tyr Lys Ile Gln Ser Tyr Ser Glu Tyr  
                   1070                                  1075                                  1080

Leu Lys Asp Phe Trp Gly Asn Pro Leu Met Tyr Asn Lys Glu Tyr  
                   1085                                  1090                                  1095

Tyr Met Phe Asn Ala Gly Asn Lys Asn Ser Tyr Ile Lys Leu Lys  
                   1100                                  1105                                  1110

Lys Asp Ser Pro Val Gly Glu Ile Leu Thr Arg Ser Lys Tyr Asn  
                   1115                                  1120                                  1125

Gln Asn Ser Lys Tyr Ile Asn Tyr Arg Asp Leu Tyr Ile Gly Glu  
                   1130                                  1135                                  1140

Lys Phe Ile Ile Arg Arg Lys Ser Asn Ser Gln Ser Ile Asn Asp  
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 1 5 10 15

aat aat att att atg atg gag cct cca ttt gcg aga ggt acg ggg aga 96  
 Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg  
 20 25 30

tat tat aaa gct ttt aaa atc aca gat cgt att tgg ata ata ccg gaa 144  
 Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
 35 40 45

aga tat act ttt gga tat aaa cct gag gat ttt aat aaa agt tcc ggt 192  
 Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
 50 55 60

att ttt aat aga gat gtt tgt gaa tat tat gat cca gat tac tta aat 240  
 Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
 65 70 75 80

act aat gat aaa aag aat ata ttt tta caa aca atg atc aag tta ttt 288  
 Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe  
 85 90 95

aat aga atc aaa tca aaa cca ttg ggt gaa aag tta tta gag atg att 336  
 Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
 100 105 110

ata aat ggt ata cct tat ctt gga gat aga cgt gtt cca ctc gaa gag 384  
 Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
 115 120 125

ttt aac aca aac att gct agt gta act gtt aat aaa tta atc agt aat 432  
 Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
 130 135 140

cca gga gaa gtg gag cga aaa aaa ggt att ttc gca aat tta ata ata 480  
 Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
 145 150 155 160

ttt gga cct ggg cca gtt tta aat gaa aat gag act ata gat ata ggt 528  
 Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
 165 170 175

ata caa aat cat ttt gca tca agg gaa ggc ttc ggg ggt ata atg caa 576  
 Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
 180 185 190

atg aag ttt tgc cca gaa tat gta agc gta ttt aat aat gtt caa gaa 624  
 Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
 195 200 205

aac aaa ggc gca agt ata ttt aat aga cgt gga tat ttt tca gat cca 672  
 Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
 210 215 220

gcc ttg ata tta atg cat gaa ctt ata cat gtt tta cat gga tta tat 720  
 Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

ggc att aaa gta gat gat tta cca att gta cca aat gaa aaa aaa ttt 768  
 Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255

ttt atg caa tct aca gat gct ata cag gca gaa gaa cta tat aca ttt 816

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Phe	Met	Gln	Ser	Thr	Asp	Ala	Ile	Gln	Ala	Glu	Glu	Leu	Tyr	Thr	Phe		
			260					265					270				
gga	gga	caa	gat	ccc	agc	atc	ata	act	cct	tct	acg	gat	aaa	agt	atc		864
Gly	Gly	Gln	Asp	Pro	Ser	Ile	Ile	Thr	Pro	Ser	Thr	Asp	Lys	Ser	Ile		
		275					280					285					
tat	gat	aaa	ggt	ttg	caa	aat	ttt	aga	ggg	ata	ggt	gat	aga	ctt	aac		912
Tyr	Asp	Lys	Val	Leu	Gln	Asn	Phe	Arg	Gly	Ile	Val	Asp	Arg	Leu	Asn		
	290					295					300						
aag	ggt	tta	ggt	tgc	ata	tca	gat	cct	aac	att	aat	att	aat	ata	tat		960
Lys	Val	Leu	Val	Cys	Ile	Ser	Asp	Pro	Asn	Ile	Asn	Ile	Asn	Ile	Tyr		
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Lys	Asn	Lys	Phe	Lys	Asp	Lys	Tyr	Lys	Phe	Val	Glu	Asp	Ser	Glu	Gly		
			325						330					335			
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Lys	Tyr	Ser	Ile	Asp	Val	Glu	Ser	Phe	Asp	Lys	Leu	Tyr	Lys	Ser	Leu		
		340						345					350				
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Met	Phe	Gly	Phe	Thr	Glu	Thr	Asn	Ile	Ala	Glu	Asn	Tyr	Lys	Ile	Lys		
		355					360					365					
act	aga	gct	tct	tat	ttt	agt	gat	tcc	tta	cca	cca	gta	aaa	ata	aaa		1152
Thr	Arg	Ala	Ser	Tyr	Phe	Ser	Asp	Ser	Leu	Pro	Pro	Val	Lys	Ile	Lys		
	370					375					380						
aat	tta	tta	gat	aat	gaa	atc	tat	act	ata	gag	gaa	ggg	ttt	aat	ata		1200
Asn	Leu	Leu	Asp	Asn	Glu	Ile	Tyr	Thr	Ile	Glu	Glu	Gly	Phe	Asn	Ile		
385					390					395					400		
tct	gat	aaa	gat	atg	gaa	aaa	gaa	tat	aga	ggt	cag	aat	aaa	gct	ata		1248
Ser	Asp	Lys	Asp	Met	Glu	Lys	Glu	Tyr	Arg	Gly	Gln	Asn	Lys	Ala	Ile		
				405				410					415				
aat	aaa	caa	gct	tat	gaa	gaa	att	agc	aag	gag	cat	ttg	gct	gta	tat		1296
Asn	Lys	Gln	Ala	Tyr	Glu	Glu	Ile	Ser	Lys	Glu	His	Leu	Ala	Val	Tyr		
		420						425				430					
aag	ata	caa	atg	tgt	aaa	agt	ggt	aaa	gct	cca	gga	ata	tgt	att	gat		1344
Lys	Ile	Gln	Met	Cys	Lys	Ser	Val	Lys	Ala	Pro	Gly	Ile	Cys	Ile	Asp		
		435					440					445					
ggt	gat	aat	gaa	gat	ttg	ttc	ttt	ata	gct	gat	aaa	aat	agt	ttt	tca		1392
Val	Asp	Asn	Glu	Asp	Leu	Phe	Phe	Ile	Ala	Asp	Lys	Asn	Ser	Phe	Ser		
	450					455					460						
gat	gat	tta	tct	aaa	aac	gaa	aga	ata	gaa	tat	aat	aca	cag	agt	aat		1440
Asp	Asp	Leu	Ser	Lys	Asn	Glu	Arg	Ile	Glu	Tyr	Asn	Thr	Gln	Ser	Asn		
465					470					475					480		
tat	ata	gaa	aat	gac	ttc	cct	ata	aat	gaa	tta	att	tta	gat	act	gat		1488
Tyr	Ile	Glu	Asn	Asp	Phe	Pro	Ile	Asn	Glu	Leu	Ile	Leu	Asp	Thr	Asp		
				485					490					495			
tta	ata	agt	aaa	ata	gaa	tta	cca	agt	gaa	aat	aca	gaa	tca	ctt	act		1536
Leu	Ile	Ser	Lys	Ile	Glu	Leu	Pro	Ser	Glu	Asn	Thr	Glu	Ser	Leu	Thr		
		500						505					510				
gat	ttt	aat	gta	gat	ggt	cca	gta	tat	gaa	aaa	caa	ccc	gct	ata	aaa		1584
Asp	Phe	Asn	Val	Asp	Val	Pro	Val	Tyr	Glu	Lys	Gln	Pro	Ala	Ile	Lys		
		515					520					525					



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aaa att ttt aca gat gaa aat acc atc ttt caa tat tta tac tct cag Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln 530 535 540	1632
aca ttt cct cta gat ata aga gat ata agt tta aca tct tca ttt gat Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp 545 550 555 560	1680
gat gca tta tta ttt tct aac aaa gtt tat tca ttt ttt tct atg gat Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp 565 570 575	1728
tat att aaa act gct aat aaa gtg gta gaa gca gga tta ttt gca ggt Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly 580 585 590	1776
tgg gtg aaa cag ata gta aat gat ttt gta atc gaa gct aat aaa agc Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser 595 600 605	1824
aat act atg gat aaa att gca gat ata tct cta att gtt cct tat ata Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile 610 615 620	1872
gga tta gct tta aat gta gga aat gaa aca gct aaa gga aat ttt gaa Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu 625 630 635 640	1920
aat gct ttt gag att gca gga gcc agt att cta cta gaa ttt ata cca Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro 645 650 655	1968
gaa ctt tta ata cct gta gtt gga gcc ttt tta tta gaa tca tat att Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile 660 665 670	2016
gac aat aaa aat aaa att att aaa aca ata gat aat gct tta act aaa Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys 675 680 685	2064
aga aat gaa aaa tgg agt gat atg tac gga tta ata gta gcg caa tgg Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp 690 695 700	2112
ctc tca aca gtt aat act caa ttt tat aca ata aaa gag gga atg tat Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr 705 710 715 720	2160
aag gct tta aat tat caa gca caa gca ttg gaa gaa ata ata aaa tac Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr 725 730 735	2208
aga tat aat ata tat tct gaa aaa gaa aag tca aat att aac atc gat Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp 740 745 750	2256
ttt aat gat ata aat tct aaa ctt aat gag ggt att aac caa gct ata Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile 755 760 765	2304
gat aat ata aat aat ttt ata aat gga tgt tct gta tca tat tta atg Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met 770 775 780	2352
aaa aaa atg att cca tta gct gta gaa aaa tta cta gac ttt gat aat Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn	2400

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785	790	795	800	
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Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr	805	810	815	
ttg att gga agt gca gaa tat gaa aaa tca aaa gta aat aaa tac ttg				2496
Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu	820	825	830	
aaa acc att atg ccg ttt gat ctt tca ata tat acc aat gat aca ata				2544
Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile	835	840	845	
cta ata gaa atg ttt aat aaa tat aat agc				2574
Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser	850	855		

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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
 35 40 45

Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
 50 55 60

Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
 65 70 75 80

Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe  
 85 90 95

Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
 100 105 110

Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
 115 120 125

Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
 130 135 140

Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
 145 150 155 160

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Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
 165 170 175

Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
 180 185 190

Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
 195 200 205

Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
 210 215 220

Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255

Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
 260 265 270

Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
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Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
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Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
 325 330 335

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
 340 345 350

Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
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Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
 370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
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Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
 405 410 415

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr  
 420 425 430

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Lys Ile Gln Met Cys Lys Ser Val Lys Ala Pro Gly Ile Cys Ile Asp  
 435 440 445

Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser  
 450 455 460

Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn  
 465 470 475 480

Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp  
 485 490 495

Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr  
 500 505 510

Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys  
 515 520 525

Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln  
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Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp  
 545 550 555 560

Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp  
 565 570 575

Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly  
 580 585 590

Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser  
 595 600 605

Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile  
 610 615 620

Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu  
 625 630 635 640

Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro  
 645 650 655

Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile  
 660 665 670

Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys  
 675 680 685

Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp

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Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr			
	725	730	735
Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp			
	740	745	750
Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile			
	755	760	765
Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met			
	770	775	780
Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn			
	785	790	800
Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr			
	805	810	815
Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu			
	820	825	830
Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile			
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Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg			
	20	25	30
tat tat aaa gct ttt aaa atc aca gat cgt att tgg ata ata ccg gaa			144
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu			
	35	40	45

aga tat act ttt gga tat aaa cct gag gat ttt aat aaa agt tcc ggt	192
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly	
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att ttt aat aga gat gtt tgt gaa tat tat gat cca gat tac tta aat	240
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn	
65 70 75 80	
act aat gat aaa aag aat ata ttt tta caa aca atg atc aag tta ttt	288
Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe	
85 90 95	
aat aga atc aaa tca aaa cca ttg ggt gaa aag tta tta gag atg att	336
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile	
100 105 110	
ata aat ggt ata cct tat ctt gga gat aga cgt gtt cca ctc gaa gag	384
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu	
115 120 125	
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Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn	
130 135 140	
cca gga gaa gtg gag cga aaa aaa ggt att ttc gca aat tta ata ata	480
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile	
145 150 155 160	
ttt gga cct ggg cca gtt tta aat gaa aat gag act ata gat ata ggt	528
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly	
165 170 175	
ata caa aat cat ttt gca tca agg gaa ggc ttc ggg ggt ata atg caa	576
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln	
180 185 190	
atg aag ttt tgc cca gaa tat gta agc gta ttt aat aat gtt caa gaa	624
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu	
195 200 205	
aac aaa ggc gca agt ata ttt aat aga cgt gga tat ttt tca gat cca	672
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro	
210 215 220	
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Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr	
225 230 235 240	
ggc att aaa gta gat gat tta cca att gta cca aat gaa aaa aaa ttt	768
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe	
245 250 255	
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Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe	
260 265 270	
gga gga caa gat ccc agc atc ata act cct tct acg gat aaa agt atc	864
Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile	
275 280 285	
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Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn	
290 295 300	
aag gtt tta gtt tgc ata tca gat cct aac att aat att aat ata tat	960
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr	

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305	310	315	320	
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Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly				
	325	330	335	
aaa tat agt ata gat gta gaa agt ttt gat aaa tta tat aaa agc tta				1056
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu				
	340	345	350	
atg ttt ggt ttt aca gaa act aat ata gca gaa aat tat aaa ata aaa				1104
Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys				
	355	360	365	
act aga gct tct tat ttt agt gat tcc tta cca cca gta aaa ata aaa				1152
Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys				
	370	375	380	
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Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile				
	385	390	395	400
tct gat aaa gat atg gaa aaa gaa tat aga ggt cag aat aaa gct ata				1248
Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile				
	405	410	415	
aat aaa caa gct tat gaa gaa att agc aag gag cat ttg gct gta tat				1296
Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr				
	420	425	430	
aag ata caa atg tgt aaa agt gtt aaa gct cca gga ata tgt att gat				1344
Lys Ile Gln Met Cys Lys Ser Val Lys Ala Pro Gly Ile Cys Ile Asp				
	435	440	445	
gtt gat aat gaa gat ttg ttc ttt ata gct gat aaa aat agt ttt tca				1392
Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser				
	450	455	460	
gat gat tta tct aaa aac gaa aga ata gaa tat aat aca cag agt aat				1440
Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn				
	465	470	475	480
tat ata gaa aat gac ttc cct ata aat gaa tta att tta gat act gat				1488
Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp				
	485	490	495	
tta ata agt aaa ata gaa tta cca agt gaa aat aca gaa tca ctt act				1536
Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr				
	500	505	510	
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Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys				
	515	520	525	
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Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln				
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Thr Phe Pro Leu				
545				

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&lt;213&gt; Clostridium botulinum

&lt;400&gt; 24

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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
 35 40 45

Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
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Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
 65 70 75 80

Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe  
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Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
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Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
 115 120 125

Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
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Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
 145 150 155 160

Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
 165 170 175

Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
 180 185 190

Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
 195 200 205

Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
 210 215 220

Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255



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Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
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Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
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Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
 305 310 315 320

Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
 325 330 335

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
 340 345 350

Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
 355 360 365

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
 370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
 385 390 395 400

Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
 405 410 415

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr  
 420 425 430

Lys Ile Gln Met Cys Lys Ser Val Lys Ala Pro Gly Ile Cys Ile Asp  
 435 440 445

Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser  
 450 455 460

Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn  
 465 470 475 480

Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp  
 485 490 495

Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr  
 500 505 510

Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys

- 86 -

515

520

525

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 gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg 96  
 Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30  
 gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc 144  
 Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45  
 gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa 192  
 Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
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 gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca 240  
 Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80  
 gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag 288  
 Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95  
 cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc 336  
 Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110  
 cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag 384  
 Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125  
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 Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140  
 aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att 480  
 Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
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 Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
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cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe 180 185 190	576
acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg ctg ttg Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu 195 200 205	624
ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu 210 215 220	672
ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240	720
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Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
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Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
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Thr Ile Tyr	Asp Gly Phe Asn Leu Arg	Asn Thr Asn Leu Ala Ala Asn			
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Phe Asn Gly	Gln Asn Thr Glu Ile	Asn Asn Met Asn Phe Thr Lys Leu			
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Lys Asn Phe	Thr Gly Leu Phe Glu	Phe Tyr Lys Leu Leu Cys Val Arg			
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Gly Ile Ile	Thr Ser Lys Thr Lys Ser	Leu Asp Lys Gly Tyr Asn Lys			
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Ala Leu Asn	Asp Leu Cys Ile Lys Val	Asn Asn Trp Asp Leu Phe Phe			
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 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
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Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
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<212> DNA

<213> Clostridium botulinum

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<212> DNA  
<213> Clostridium botulinum

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 tcatatttaa tgaaaaaaat gattccatta gctgtagaaa aattactaga ctttgataat 2400  
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&lt;210&gt; 29

&lt;211&gt; 2640

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 29

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 tataaagacc cagttaacgg tgttgacatt gcttacatca aaatcccgaa cgctggccag 120

atgcagccgg taaaggcatt caaaatccac aacaaaatct gggttatccc ggaacgtgat	180
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- 97 -

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cgtggcactc tgatcggta ggttgatcgt ctgaaggaca aagtgaacaa taccttatcg 2580
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<210> 30
<211> 879
<212> PRT
<213> Clostridium botulinum

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<400> 30

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Thr Ser Leu Tyr Lys Lys Ala Gly Phe Gly Ser Met Glu Phe Val Asn
1           5           10           15

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Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr
20           25           30

```

```

Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro Val Lys Ala Phe Lys
35           40           45

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```

Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg Asp Thr Phe Thr Asn
50           55           60

```

```

Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu Ala Lys Gln Val Pro
65           70           75           80

```

```

Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr Asp Asn Glu Lys Asp
85           90           95

```

```

Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu Arg Ile Tyr Ser Thr
100          105          110

```

```

Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val Arg Gly Ile Pro Phe
115          120          125

```

```

Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys Val Ile Asp Thr Asn
130          135          140

```

```

Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr Arg Ser Glu Glu Leu
145          150          155          160

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- 98 -

Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile Ile Gln Phe Glu Cys  
 165 170 175

Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr Arg Asn Gly Tyr Gly  
 180 185 190

Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe Thr Phe Gly Phe Glu  
 195 200 205

Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu Gly Ala Gly Lys Phe  
 210 215 220

Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu Leu Ile His Ala Gly  
 225 230 235 240

His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn Arg Val Phe Lys Val  
 245 250 255

Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu Glu Val Ser Phe Glu  
 260 265 270

Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys Phe Ile Asp Ser Leu  
 275 280 285

Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn Lys Phe Lys Asp Ile  
 290 295 300

Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val Gly Thr Thr Ala Ser  
 305 310 315 320

Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys Tyr Leu Leu Ser Glu  
 325 330 335

Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu Lys Phe Asp Lys Leu  
 340 345 350

Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp Asn Phe Val Lys Phe  
 355 360 365

Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn Phe Asp Lys Ala Val  
 370 375 380

Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr Thr Ile Tyr Asp Gly  
 385 390 395 400

Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn  
 405 410 415

Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly  
 420 425 430

Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser  
 435 440 445

Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly Tyr Asn Lys Ala Leu  
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Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe Ser Pro  
 465 470 475 480

Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu Ile Thr  
 485 490 495

Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu Asp Leu  
 500 505 510

Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro Glu Asn  
 515 520 525

Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu Glu Leu  
 530 535 540

Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu Leu Asp  
 545 550 555 560

Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu His Gly  
 565 570 575

Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu Leu Asn  
 580 585 590

Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys Lys Val  
 595 600 605

Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu Gln Leu  
 610 615 620

Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr Asp Lys  
 625 630 635 640

Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala Leu Asn  
 645 650 655

Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu Ile Phe  
 660 665 670

Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala Ile Pro  
 675 680 685

Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys Val Leu

- 100 -

690                      695                      700  
 Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu Lys Trp  
 705                      710                      715                      720  
 Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys Val Asn  
 725                      730                      735  
 Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu Glu Asn  
 740                      745                      750  
 Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr  
 755                      760                      765  
 Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp Leu Ser  
 770                      775                      780  
 Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile Asn Lys  
 785                      790                      795                      800  
 Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met Ile Pro  
 805                      810                      815  
 Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys Asp Ala  
 820                      825                      830  
 Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly Gln Val  
 835                      840                      845  
 Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp Ile Pro  
 850                      855                      860  
 Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser Thr  
 865                      870                      875

&lt;210&gt; 31

&lt;211&gt; 2609

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 31

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- 102 -

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 <211> 866  
 <212> PRT  
 <213> Clostridium botulinum  
 <400> 32

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 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

- 103 -

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly  
 435 440 445

Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp  
 450 455 460

Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys

- 104 -

465	470	475	480
Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn	485	490	495
Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp	500	505	510
Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile	515	520	525
Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys	530	535	540
Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln	545	550	555
Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn	565	570	575
Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp	580	585	590
Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly	595	600	605
Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val	610	615	620
Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile	625	630	635
Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val	645	650	655
Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro	660	665	670
Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile	675	680	685
Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys	690	695	700
Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp	705	710	715
Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys	725	730	735

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Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr  
 740 745 750

Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn  
 755 760 765

Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met  
 770 775 780

Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met  
 785 790 795 800

Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala  
 805 810 815

Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr  
 820 825 830

Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu  
 835 840 845

Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg  
 850 855 860

Leu Leu  
 865

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 <213> Clostridium botulinum

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 cacaacaaaa tctgggttat cccggaacgt gataccttta ctaaccgga agaaggtgac 180  
 ctgaaccgc caccggaagc gaaacaggtg cgggtatctt actatgactc cacctacctg 240  
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 gttaccctgg ctacgaact gattcatgca ggccaccgcc tgtacggtat cgccatcaat 720

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aaccaacgcc ttttgtcgac	2600

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<211> 863  
 <212> PRT  
 <213> Clostridium botulinum

<400> 34

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 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240





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Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
 515 520 525

Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
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Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
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His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
 565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
 580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
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Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
 725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile

- 110 -

770

775

780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
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Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
 805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
 820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
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Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu  
 850 855 860

&lt;210&gt; 35

&lt;211&gt; 2600

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 35

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&lt;210&gt; 36

&lt;211&gt; 863

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 36

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Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
20           25           30

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

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Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
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Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
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Gly Ile Ile Thr Ser Lys Leu Glu Val Leu Phe Gln Gly Pro Asn Lys  
 435 440 445

Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
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Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu  
 465 470 475 480

Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu  
 485 490 495

Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro  
 500 505 510

Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
 515 520 525

Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
 530 535 540

Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
 545 550 555 560

His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu

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565

570

575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
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Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
 625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
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Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
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Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
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Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
 785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
 805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
 820 825 830

- 115 -

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
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Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu  
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 <211> 2600  
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<213> Clostridium botulinum

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 <213> Clostridium botulinum

<400> 38

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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
          20          25          30

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
          35          40          45

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```

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu
          50          55          60

```

```

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr
          65          70          75          80

```

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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu
          85          90          95

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- 117 -

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn

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355

360

365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
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Gly Ile Ile Thr Ser Lys Thr Lys Leu Val Pro Arg Gly Ser Asn Lys  
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Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
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Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu  
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Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu  
 485 490 495

Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro  
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Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
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Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
 530 535 540

Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
 545 550 555 560

His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
 565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
 580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

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Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
835 840 845

Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu  
850 855 860

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<212> DNA  
<213> Clostridium botulinum

<400> 39

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- 121 -

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&lt;210&gt; 40

&lt;211&gt; 1127

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 40

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys

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Lys	Phe	Asp	Lys	Leu	Tyr	Lys	Met	Leu	Thr	Glu	Ile	Tyr	Thr	Glu	Asp
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Asn	Phe	Val	Lys	Phe	Phe	Lys	Val	Leu	Asn	Arg	Lys	Thr	Tyr	Leu	Asn
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Thr	Ile	Tyr	Asp	Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	Ala	Asn
385					390					395					400
Phe	Asn	Gly	Gln	Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu
			405					410						415	
Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu	Phe	Tyr	Lys	Leu	Leu	Cys	Val	Arg
			420					425					430		
Gly	Ile	Ile	Thr	Ser	Lys	Thr	Lys	Ser	Leu	Asp	Lys	Gly	Tyr	Asn	Lys
	435						440					445			
Ala	Leu	Asn	Asp	Leu	Cys	Ile	Lys	Val	Asn	Asn	Trp	Asp	Leu	Phe	Phe
	450					455					460				
Ser	Pro	Ser	Glu	Asp	Asn	Phe	Thr	Asn	Asp	Leu	Asn	Lys	Gly	Glu	Glu
465					470					475					480
Ile	Thr	Ser	Asp	Thr	Asn	Ile	Glu	Ala	Ala	Glu	Glu	Asn	Ile	Ser	Leu
				485					490					495	
Asp	Leu	Ile	Gln	Gln	Tyr	Tyr	Leu	Thr	Phe	Asn	Phe	Asp	Asn	Glu	Pro
			500					505					510		
Glu	Asn	Ile	Ser	Ile	Glu	Asn	Leu	Ser	Ser	Asp	Ile	Ile	Gly	Gln	Leu
	515						520					525			
Glu	Leu	Met	Pro	Asn	Ile	Glu	Arg	Phe	Pro	Asn	Gly	Lys	Lys	Tyr	Glu
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Leu	Asp	Lys	Tyr	Thr	Met	Phe	His	Tyr	Leu	Arg	Ala	Gln	Glu	Phe	Glu
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His	Gly	Lys	Ser	Arg	Ile	Ala	Leu	Thr	Asn	Ser	Val	Asn	Glu	Ala	Leu
				565					570					575	

- 124 -

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
835 840 845



- 125 -

Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
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Thr Phe Thr Glu Tyr Ile Lys Gly Gly Gly Gly Ser Gly Gly Gly Gly  
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Ser Gly Gly Gly Gly Ser Val Glu Thr Ile Ser Phe Ser Phe Ser Glu  
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Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala Ile Ile  
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Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn Gly Met  
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Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro Val His  
930 935 940

Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr Arg Phe  
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Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala Asp Gly  
965 970 975

Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln Gly Tyr  
980 985 990

Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser Tyr Gln  
995 1000 1005

Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp Asp Pro  
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Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile Arg Ser  
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Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val Ala Asn  
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Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu Ala Val  
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Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala Glu Ile  
1070 1075 1080

Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val Gly Leu  
1085 1090 1095

Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu Thr His Asp

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1100

1105

1110

Val	Tyr	Ser	Trp	Ser	Phe	His	Ala	Ser	Leu	Pro	Glu	Thr	Asn
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&lt;210&gt; 41

&lt;211&gt; 3388

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 41

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- 127 -

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&lt;210&gt; 42

&lt;211&gt; 1129

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

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&lt;400&gt; 42

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

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Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
435 440 445

Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
450 455 460

Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu  
465 470 475 480

Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu  
485 490 495

Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro  
500 505 510

Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
515 520 525

Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
 530 535 540

Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
 545 550 555 560

His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
 565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
 580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
 625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
 725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met

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785		790		795		800
Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys						
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Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly						
	820		825		830	
Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp						
	835		840		845	
Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser						
	850		855		860	
Thr Phe Thr Glu Tyr Ile Lys Ala Glu Ala Ala Ala Lys Glu Ala Ala						
	865		870		875	880
Ala Lys Glu Ala Ala Ala Lys Ala Val Glu Thr Ile Ser Phe Ser Phe						
		885		890		895
Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala						
	900		905		910	
Ile Ile Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn						
	915		920		925	
Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro						
	930		935		940	
Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr						
	945		950		955	960
Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala						
		965		970		975
Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln						
	980		985		990	
Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser						
	995		1000		1005	
Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp						
	1010		1015		1020	
Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile						
	1025		1030		1035	
Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val						
	1040		1045		1050	

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Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu  
1055 1060 1065

Ala Val Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala  
1070 1075 1080

Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val  
1085 1090 1095

Gly Leu Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu Thr  
1100 1105 1110

His Asp Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr  
1115 1120 1125

Asn

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<212> DNA  
<213> Clostridium botulinum

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ccgccaccgg aagcgaaaca ggtgccggta tcttactatg actccaccta cctgtctacc 240  
gataacgaaa aggacaacta cctgaaaggt gttactaaac tgttcgagcg tatttactcc 300  
accgacctgg gccgtatgct gctgactagc atcgttcgcg gtatcccgtt ctggggcggt 360  
tctaccatcg ataccgaact gaaagtaatc gacactaact gcatcaacgt tattcagccg 420  
gacggttcct atcgttccga agaactgaac ctgggtgatca tcggcccgtc tgctgatatc 480  
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cgtgtcttca aagttaacac caacgcgtat tacgagatgt ccggtctgga agtaagcttc 780  
gaagaactgc gtacttttgg cggtcacgac gctaaattca tcgactctct gcaagaaaac 840  
gagttccgtc tgtactacta taacaagttc aaagatatcg catccaccct gaacaaagcg 900  
aaatccatcg tgggtaccac tgcttctctg cagtacatga agaacgtttt taaagaaaaa 960  
tacctgctca gcgaagacac ctccggcaaa ttctctgtag acaagttgaa attcgataaa 1020  
ctttacaaaa tgctgactga aatttacacc gaagacaact tcgttaagtt ctttaaagtt 1080



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ctgaaccgca aaacctatct gaacttcgac aaggcagtat tcaaaatcaa catcgtgccg	1140
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tttaacggcc agaacacgga aatcaacaac atgaacttca caaaactgaa aaacttcaact	1260
ggtctgttcg agttttacaa gctgctgtgc gtacgtggca tcattacctc caaaactaaa	1320
tctctggatg acgatgacaa aggttataac aaagcgctga acgacctctg tatcaagggtt	1380
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ctatatacta aacctgtgca catttgggat atgaccacag gcactgtggc cagctttgaa	2880
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<210> 44  
 <211> 1130  
 <212> PRT  
 <213> Clostridium botulinum

<400> 44

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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

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Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly  
 435 440 445

Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp

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450		455		460
Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys				
465		470		475 480
Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn				
		485		490 495
Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp				
		500		505 510
Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile				
		515		520 525
Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys				
		530		535 540
Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln				
545		550		555 560
Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn				
		565		570 575
Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp				
		580		585 590
Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly				
		595		600 605
Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val				
		610		615 620
Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile				
625		630		635 640
Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val				
		645		650 655
Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro				
		660		665 670
Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile				
		675		680 685
Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys				
		690		695 700
Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp				
705		710		715 720

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Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys  
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Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr  
                   740                  745                  750

Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn  
                   755                  760                  765

Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met  
                   770                  775                  780

Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met  
                   785                  790                  795                  800

Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala  
                   805                  810                  815

Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr  
                   820                  825                  830

Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu  
                   835                  840                  845

Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg  
                   850                  855                  860

Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Gly Gly Gly Gly Ser Gly  
                   865                  870                  875                  880

Gly Gly Gly Ser Gly Gly Gly Gly Ser Val Glu Thr Ile Ser Phe Ser  
                   885                  890                  895

Phe Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala  
                   900                  905                  910

Ala Ile Ile Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln  
                   915                  920                  925

Asn Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys  
                   930                  935                  940

Pro Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu  
                   945                  950                  955                  960

Thr Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro  
                   965                  970                  975

Ala Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala  
                   980                  985                  990

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Gln Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn  
 995 1000 1005

Ser Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro  
 1010 1015 1020

Trp Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser  
 1025 1030 1035

Ile Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln  
 1040 1045 1050

Val Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu  
 1055 1060 1065

Leu Ala Val Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile  
 1070 1075 1080

Ala Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp  
 1085 1090 1095

Val Gly Leu Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu  
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Thr His Asp Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu  
 1115 1120 1125

Thr Asn  
 1130

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 aaaatctggg ttatcccga acgtgatacc tttactaacc cggaagaagg tgacctgaac 180  
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- 140 -

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125



- 141 -

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn

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385		390		395		400
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu						
		405		410		415
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg						
		420		425		430
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly						
		435		440		445
Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp						
		450		455		460
Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys						
		465		470		475
Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn						
		485		490		495
Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp						
		500		505		510
Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile						
		515		520		525
Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys						
		530		535		540
Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln						
		545		550		555
Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn						
		565		570		575
Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp						
		580		585		590
Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly						
		595		600		605
Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val						
		610		615		620
Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile						
		625		630		635
Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val						
		645		650		655

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Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro  
 660 665 670

Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile  
 675 680 685

Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys  
 690 695 700

Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp  
 705 710 715 720

Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys  
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Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr  
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Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn  
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Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met  
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Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met  
 785 790 795 800

Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala  
 805 810 815

Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr  
 820 825 830

Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu  
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Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg  
 850 855 860

Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ala Glu Ala Ala Ala Lys  
 865 870 875 880

Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Ala Val Glu Thr Ile Ser  
 885 890 895

Phe Ser Phe Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln  
 900 905 910

Gly Ala Ala Ile Ile Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile  
 915 920 925

- 144 -

Asn Gln Asn Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr  
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Thr Lys Pro Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser  
 945 950 955 960

Phe Glu Thr Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro  
 965 970 975

Leu Pro Ala Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys  
 980 985 990

Pro Ala Gln Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln  
 995 1000 1005

Asp Asn Ser Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser  
 1010 1015 1020

Asn Pro Trp Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val  
 1025 1030 1035

Asn Ser Ile Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn  
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Gly Gln Val Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys  
 1055 1060 1065

Ile Leu Leu Ala Val Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr  
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Thr Ile Ala Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp  
 1085 1090 1095

Val Asp Val Gly Leu Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala  
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Ala Glu Thr His Asp Val Tyr Ser Trp Ser Phe His Ala Ser Leu  
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&lt;210&gt; 48

&lt;211&gt; 1129

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 48

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Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
20          25          30

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
35          40          45

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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu
50          55          60

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Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu

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325	330	335
Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp 340 345 350		
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Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380		
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400		
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415		
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430		
Gly Ile Ile Thr Ser Lys Thr Lys Leu Val Pro Arg Gly Ser Asn Lys 435 440 445		
Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe 450 455 460		
Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu 465 470 475 480		
Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu 485 490 495		
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Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu 515 520 525		
Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu 530 535 540		
Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu 545 550 555 560		
His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu 565 570 575		
Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys 580 585 590		



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Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
 625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
 725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
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Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
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Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
 820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
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Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
 850 855 860

- 150 -

Thr Phe Thr Glu Tyr Ile Lys Ala Glu Ala Ala Lys Glu Ala Ala  
865 870 875 880

Ala Lys Glu Ala Ala Ala Lys Ala Val Glu Thr Ile Ser Phe Ser Phe  
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Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala  
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Ile Ile Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn  
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Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro  
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Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr  
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Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala  
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Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln  
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Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser  
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Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp  
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Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile  
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Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val  
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Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu  
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Ala Val Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala  
1070 1075 1080

Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val  
1085 1090 1095

Gly Leu Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu Thr  
1100 1105 1110

His Asp Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr

1115

1120

1125

Asn

&lt;210&gt; 49

&lt;211&gt; 3382

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 49

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gcctcgttgc cagaaacaaa cg 3382

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<210> 50
<211> 1127
<212> PRT
<213> Clostridium botulinum

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&lt;400&gt; 50

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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

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Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Leu Val Pro Arg Gly Ser Asn Lys  
 435 440 445

Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
 450 455 460

Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu  
 465 470 475 480

Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu  
 485 490 495

Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro  
 500 505 510

Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
 515 520 525

- 155 -

Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
 530 535 540

Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
 545 550 555 560

His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
 565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
 580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
 625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
 725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met

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785		790		795		800
Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys	805		810			815
Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly	820		825			830
Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp	835		840			845
Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser	850		855			860
Thr Phe Thr Glu Tyr Ile Lys Gly Gly Gly Gly Ser Gly Gly Gly Gly	865		870		875	880
Ser Gly Gly Gly Gly Ser Val Glu Thr Ile Ser Phe Ser Phe Ser Glu	885		890			895
Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala Ile Ile	900		905			910
Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn Gly Met	915		920			925
Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro Val His	930		935			940
Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr Arg Phe	945		950		955	960
Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala Asp Gly	965		970			975
Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln Gly Tyr	980		985			990
Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser Tyr Gln	995		1000			1005
Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp Asp Pro	1010		1015			1020
Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile Arg Ser	1025		1030			1035
Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val Ala Asn	1040		1045			1050



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Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu Ala Val  
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Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala Glu Ile  
1070 1075 1080

Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val Gly Leu  
1085 1090 1095

Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu Thr His Asp  
1100 1105 1110

Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr Asn  
1115 1120 1125

&lt;210&gt; 51

&lt;211&gt; 3388

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 51

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 <212> PRT  
 <213> Clostridium botulinum

<400> 52

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
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Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
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Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
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Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
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Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

- 160 -

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220  
 Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
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 245 250 255  
 Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270  
 Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285  
 Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300  
 Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320  
 Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335  
 Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350  
 Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365  
 Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380  
 Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400  
 Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415  
 Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430  
 Gly Ile Ile Thr Ser Lys Leu Glu Val Leu Phe Gln Gly Pro Asn Lys  
 435 440 445  
 Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
 450 455 460  
 Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu

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465		470		475		480
Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu						
		485		490		495
Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro						
		500		505		510
Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu						
		515		520		525
Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu						
		530		535		540
Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu						
		545		550		555
				560		
His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu						
		565		570		575
Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys						
		580		585		590
Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu						
		595		600		605
Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr						
		610		615		620
Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala						
		625		630		635
				640		
Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu						
		645		650		655
Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala						
		660		665		670
Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys						
		675		680		685
Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu						
		690		695		700
Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys						
		705		710		715
				720		
Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu						
		725		730		735

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Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
 785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
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Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
 820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
 835 840 845

Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
 850 855 860

Thr Phe Thr Glu Tyr Ile Lys Ala Glu Ala Ala Lys Glu Ala Ala  
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Ala Lys Glu Ala Ala Ala Lys Ala Val Glu Thr Ile Ser Phe Ser Phe  
 885 890 895

Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala  
 900 905 910

Ile Ile Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn  
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Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro  
 930 935 940

Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr  
 945 950 955 960

Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala  
 965 970 975

Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln  
 980 985 990

Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser  
 995 1000 1005

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Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp  
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Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile  
1025 1030 1035

Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val  
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Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu  
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Ala Val Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala  
1070 1075 1080

Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val  
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His Asp Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr  
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 <213> Clostridium botulinum

<400> 54

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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
          20           25           30

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```

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
          35           40           45

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```

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu
          50           55           60

```

```

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr
          65           70           75           80

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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu
          85           90           95

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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val
          100          105          110

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Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys
          115          120          125

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Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr
          130          135          140

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Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
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Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu

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405	410	415
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Gly Ile Ile Thr Ser Lys Leu Glu Val Leu Phe Gln Gly Pro Asn Lys 435 440 445		
Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe 450 455 460		
Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu 465 470 475 480		
Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu 485 490 495		
Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro 500 505 510		
Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu 515 520 525		
Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu 530 535 540		
Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu 545 550 555 560		
His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu 565 570 575		
Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys 580 585 590		
Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu 595 600 605		
Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr 610 615 620		
Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala 625 630 635 640		
Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu 645 650 655		
Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala 660 665 670		

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Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
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Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
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Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
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Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
 805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
 820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
 835 840 845

Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
 850 855 860

Thr Phe Thr Glu Tyr Ile Lys Gly Gly Gly Gly Ser Gly Gly Gly Gly  
 865 870 875 880

Ser Gly Gly Gly Gly Ser Val Glu Thr Ile Ser Phe Ser Phe Ser Glu  
 885 890 895

Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala Ile Ile  
 900 905 910

Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn Gly Met  
 915 920 925

Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro Val His  
 930 935 940

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Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr Arg Phe  
 945 950 955 960

Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala Asp Gly  
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Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln Gly Tyr  
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Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser Tyr Gln  
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Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp Asp Pro  
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Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile Arg Ser  
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Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val Ala Asn  
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Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu Ala Val  
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Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala Glu Ile  
 1070 1075 1080

Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val Gly Leu  
 1085 1090 1095

Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu Thr His Asp  
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Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr Asn  
 1115 1120 1125

&lt;210&gt; 55

&lt;211&gt; 3388

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 55

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 <213> Clostridium botulinum

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
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Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn



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355		360		365
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr				
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Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn				
385		390		395 400
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu				
		405		410 415
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg				
		420		425 430
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Ile Glu Gly Arg Asn Lys				
		435		440 445
Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe				
		450		455 460
Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu				
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Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu				
		485		490 495
Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro				
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Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu				
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Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu				
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Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu				
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His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu				
		565		570 575
Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys				
		580		585 590
Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu				
		595		600 605
Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr				
		610		615 620

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Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
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Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
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Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
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Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
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Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
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Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
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Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
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Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
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Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
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Thr Phe Thr Glu Tyr Ile Lys Ala Glu Ala Ala Ala Lys Glu Ala Ala  
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Ala Lys Glu Ala Ala Ala Lys Ala Val Glu Thr Ile Ser Phe Ser Phe  
 885 890 895

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Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala  
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Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys Pro  
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Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu Thr  
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Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro Ala  
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Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln  
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Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser  
 995 1000 1005

Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro Trp  
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Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile  
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Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln Val  
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Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu  
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Ala Val Leu Val Tyr Pro Ser Ser Gly Ala Ile Tyr Thr Ile Ala  
 1070 1075 1080

Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val  
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Gly Leu Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu Thr  
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His Asp Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr  
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Asn

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&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 57

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<212> PRT
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<400> 58

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Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
20           25           30

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Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val

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290		295		300
Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys				
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Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu				
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Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp				
	340		345	350
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn				
	355		360	365
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr				
	370		375	380
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn				
385		390		395 400
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu				
	405		410	415
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg				
	420		425	430
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Ile Glu Gly Arg Asn Lys				
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Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe				
	450		455	460
Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu				
465		470		475 480
Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu				
	485		490	495
Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro				
	500		505	510
Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu				
	515		520	525
Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu				
	530		535	540
Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu				
545		550		555 560

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His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
 565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
 580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
 625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
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Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
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Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
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Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
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Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
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Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
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Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
 785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
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Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
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Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
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 Ser Gly Gly Gly Gly Ser Val Glu Thr Ile Ser Phe Ser Phe Ser Glu  
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 Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala Ala Ile Ile  
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 Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln Asn Gly Met  
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 Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala Gln Gly Tyr  
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 Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn Ser Tyr Gln  
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 Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser Ile Arg Ser  
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 Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu Leu Ala Val  
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 Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp Val Gly Leu

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1085		1090		1095
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Val Tyr Ser Trp Ser Phe His Ala Ser Leu Pro Glu Thr Asn				
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 <213> Clostridium botulinum

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gacaaccagc gtctgctgtc tacctgcggt ggtctgaccg acaccctgca ggctgaaacc 2640
gaccagctgg aagacgaaaa atctgctctg cagaccgaaa tcgctaacct gctgaaagaa 2700
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<210> 60  
 <211> 914  
 <212> PRT  
 <213> Clostridium botulinum

<400> 60

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

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Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350  
 Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365  
 Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380  
 Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400  
 Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415  
 Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430  
 Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly  
 435 440 445  
 Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp  
 450 455 460  
 Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys  
 465 470 475 480  
 Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn  
 485 490 495  
 Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp  
 500 505 510  
 Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile  
 515 520 525  
 Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys  
 530 535 540  
 Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln  
 545 550 555 560  
 Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn  
 565 570 575  
 Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp  
 580 585 590  
 Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly

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595		600		605
Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val				
610		615		620
Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile				
625		630		640
Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val				
		645		655
Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro				
		660		670
Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile				
		675		685
Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys				
		690		700
Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp				
705		710		720
Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys				
		725		735
Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr				
		740		750
Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn				
		755		765
Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met				
		770		780
Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met				
785		790		800
Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala				
		805		815
Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr				
		820		830
Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu				
		835		845
Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg				
		850		860

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Leu Leu Ser Thr Cys Gly Gly Leu Thr Asp Thr Leu Gln Ala Glu Thr  
865 870 875 880

Asp Gln Leu Glu Asp Glu Lys Ser Ala Leu Gln Thr Glu Ile Ala Asn  
885 890 895

Leu Leu Lys Glu Lys Glu Lys Leu Glu Phe Ile Leu Ala Ala His Gly  
900 905 910

Gly Cys

<210> 61  
<211> 2643  
<212> DNA  
<213> Clostridium botulinum

<400> 61  
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cacaacaaaa tctgggttat cccggaacgt gataccttta ctaaccgga agaaggtgac 180  
ctgaaccgc caccggaagc gaaacaggtg cgggtatctt actatgactc cacctacctg 240  
tctaccgata acgaaaagga caactacctg aaaggtgtta ctaaactgtt cgagcgtatt 300  
tactccaccg acctgggccc tatgctgctg actagcatcg ttcgcggtat cccgttctgg 360  
ggcgggttcta ccatcgatac cgaactgaaa gtaatcgaca ctaactgcat caacgttatt 420  
cagccggacg gttcctatcg ttccgaagaa ctgaacctgg tgatcatcgg cccgtctgct 480  
gatatcatcc agttcgagtg taagagcttt ggtcacgaag ttctgaacct caccgtaac 540  
ggctacgggtt cactcagta catccgtttc tctccggact tcacctcgg ttttgaagaa 600  
tccttgaag tagacacgaa cccactgctg ggcgctggta aattcgcaac tgatcctgcg 660  
gttacctgg ctcacgaact gattcatgca ggccaccgcc tgtacgggtat cgccatcaat 720  
ccgaaccgtg tcttcaaagt taacaccaac gcgtattacg agatgtccgg tctggaagta 780  
agcttcgaag aactgcgtac ttttggcggc cagcagcta aattcatcga ctctctgcaa 840  
gaaaacgagt tccgtctgta ctactataac aagttcaaag atatcgcatc caccctgaac 900  
aaagcgaaat ccatcgtggg taccactgct tctctgcagt acatgaagaa cgtttttaaa 960  
gaaaaatacc tgctcagcga agacacctcc ggcaaattct ctgtagacaa gttgaaattc 1020  
gataaacttt acaaaatgct gactgaaatt tacaccgaag acaacttcgt taagttcttt 1080  
aaagttctga accgcaaac ctatctgaac ttcgacaagg cagtattcaa aatcaacatc 1140  
gtgccgaaag ttaactacac tatctacgat ggtttcaacc tgcgtaacac caacctggct 1200  
gctaatttta acggccagaa caccgaaatc aacaacatga acttcacaaa actgaaaaac 1260  
ttcactggtc tggtcgagtt ttacaagctg ctgtgcgtac gtggcatcat tacctccaaa 1320

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actaaatctc tggatgacga tgacaaaggt tataacaaag cgctgaacga cctctgtatc 1380  
 aagggttaaca actgggattt attcttcagc ccgagtgaag acaacttcac caacgacctg 1440  
 aacaaaggtg aagaaatcac ctcagatact aacatcgaag cagccgaaga aaacatctcg 1500  
 ctggacctga tccagcagta ctacctgacc tttaatttcg acaacgagcc ggaaaacatt 1560  
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 tatgtcgata accaacgcct tttgtcgacc tgcgaagaag aagaagaaga agaagaatgc 2640  
 tga 2643

&lt;210&gt; 62

&lt;211&gt; 878

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 62

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
 1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45



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Asp Thr Phe Thr Asn Pro Glu Gly Asp Leu Asn Pro Pro Pro Glu  
50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

- 190 -

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
                   325                  330                  335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
                   340                  345                  350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
                   355                  360                  365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
                   370                  375                  380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
                   385                  390                  395                  400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
                   405                  410                  415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
                   420                  425                  430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly  
                   435                  440                  445

Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp  
                   450                  455                  460

Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys  
                   465                  470                  475                  480

Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn  
                   485                  490                  495

Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp  
                   500                  505                  510

Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile  
                   515                  520                  525

Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys  
                   530                  535                  540

Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln  
                   545                  550                  555                  560

Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn  
                   565                  570                  575

Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp

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580	585	590
Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly		
595	600	605
Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val		
610	615	620
Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile		
625	630	635
Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val		
	645	650
Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro		
	660	665
Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile		
	675	680
Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys		
	690	695
Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp		
705	710	715
Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys		
	725	730
Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr		
	740	745
Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn		
	755	760
Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met		
	770	775
Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met		
785	790	795
Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala		
	805	810
Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr		
	820	825
Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu		
	835	840
		845

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Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg  
850 855 860

Leu Leu Ser Thr Cys Glu Glu Glu Glu Glu Glu Glu Glu Cys  
865 870 875

&lt;210&gt; 63

&lt;211&gt; 2727

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 63

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aaaatctggg ttatcccggg acgtgacacc ttcaccaacc cggaagaagg tgacctgaac	180
ccgccgcggg aagctaaaca ggttccgggt tcttactacg actctaccta cctgtctacc	240
gacaacgaaa aagacaacta cctgaaaggt gttaccaaac tgttcgaacg tatctactct	300
accgacctgg gtcgtatgct gctgacctct atcggttcgtg gtatcccggt ctgggggtgg	360
tctaccatcg acaccgaact gaaagttatc gacaccaact gcatcaacgt tatccagccg	420
gacggttctt accgttctga agaactgaac ctggttatca tcggtccgtc tgctgacatc	480
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ctgggtcacg aactgatcca cgctgggtcac cgtctgtacg gtatcgctat caaccggaac	720
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gaagaactgc gtaccttcgg tggtcacgac gctaaattca tcgactctct gcaggaaaac	840
gaattccgtc tgtactacta caacaaattc aaagacatcg cttctaccct gaacaaagct	900
aaatctatcg ttggtaccac cgcttctctg cagtacatga aaaacgtttt caaagaaaaa	960
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ctgtacaaaa tgctgaccga aatctacacc gaagacaact tcgttaaatt cttcaaagtt	1080
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ggatgaagaaa tcacctctga caccaacatc gaagctgctg aagaaaacat ctctctggac	1500
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 ggtccggctc tgaacatcgg taacatgctg tacaaagacg acttcggttg tgctctgac 1980  
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 ctggaattca tcctggctgc tcaactga 2727

<210> 64  
 <211> 908  
 <212> PRT  
 <213> Clostridium botulinum

<400> 64

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
                     85                    90                    95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
                     100                    105                    110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
                     115                    120                    125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
                     130                    135                    140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
                     145                    150                    155                    160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
                     165                    170                    175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
                     180                    185                    190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
                     195                    200                    205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
                     210                    215                    220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
                     225                    230                    235                    240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
                     245                    250                    255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
                     260                    265                    270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
                     275                    280                    285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
                     290                    295                    300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
                     305                    310                    315                    320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
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Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp

- 195 -

340	345	350
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365		
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380		
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400		
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415		
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430		
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly 435 440 445		
Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp 450 455 460		
Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys 465 470 475 480		
Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn 485 490 495		
Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp 500 505 510		
Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile 515 520 525		
Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys 530 535 540		
Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln 545 550 555 560		
Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn 565 570 575		
Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp 580 585 590		
Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly 595 600 605		

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Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val  
610 615 620

Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile  
625 630 635 640

Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val  
645 650 655

Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro  
660 665 670

Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile  
675 680 685

Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys  
690 695 700

Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp  
705 710 715 720

Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys  
725 730 735

Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr  
740 745 750

Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn  
755 760 765

Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met  
770 775 780

Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met  
785 790 795 800

Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala  
805 810 815

Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr  
820 825 830

Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu  
835 840 845

Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg  
850 855 860

Leu Leu Ser Thr Leu Thr Asp Thr Leu Gln Ala Glu Thr Asp Gln Leu  
865 870 875 880



Glu Asp Glu Lys Ser Ala Leu Gln Thr Glu Ile Ala Asn Leu Leu Lys  
 885 890 895

Glu Lys Glu Lys Leu Glu Phe Ile Leu Ala Ala His  
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 <212> DNA  
 <213> Clostridium botulinum

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 aaaatctggg ttatcccga accgtgacacc ttcaccaacc cggaagaagg tgacctgaac 180  
 ccgcccggg aagctaaaca ggttccgggt tcttactacg actctaccta cctgtctacc 240  
 gacaacgaaa aagacaacta cctgaaagg gttaccaaac tgttcgaacg tatctactct 300  
 accgacctgg gtcgtatgct gctgacctct atcggttcgtg gtatcccgtt ctgggggtgg 360  
 tctaccatcg acaccgaact gaaagttatc gacaccaact gcataacgt tatccagccg 420  
 gacggttctt accgttctga agaactgaac ctgggttatca tcgggtccgtc tgctgacatc 480  
 atccagttcg aatgcaaata tttcgggtcac gaagttctga acctgaccg taacgggttac 540  
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 aaagttaact acaccatcta cgacgggttc aacctgcgta acaccaacct ggctgctaac 1200  
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 aacaactggg acctgttctt ctctccgtct gaagacaact tcaccaacga cctgaacaaa 1440  
 ggtgaagaaa tcacctctga caccaacatc gaagctgctg aagaaaacat ctctctggac 1500  
 ctgatccagc agtactacct gaccttcaac ttcgacaacg aaccggaaaa catctctatc 1560

- 198 -

gaaaacctgt cttctgacat catcggtcag ctggaactga tgccgaacat cgaacgtttc 1620  
 ccgaacggta aaaaatacga actggacaaa tacaccatgt tccactacct gcgtgctcag 1680  
 gaattcgaac acggtaaate tcgtatcgct ctgaccaact ctgttaacga agctctgctg 1740  
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 accgaagctg ctatgttcct gggttgggtt gaacagctgg ttacgactt caccgacgaa 1860  
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 ggtccggctc tgaacatcgg taacatgctg tacaaagacg acttcggttg tgctctgac 1980  
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 gctctgtcta aacgtaacga aaaatgggac gaagtttaca aatacatcgt taccaactgg 2160  
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 aacaaagcta tgatcaacat caacaaattc ctgaaccagt gctctgtttc ttacctgatg 2400  
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 aaagacaaag ttaacaacac cctgtctacc gacatcccgt tccagctgtc taaatacgtt 2580  
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<210> 66  
 <211> 876  
 <212> PRT  
 <213> Clostridium botulinum

<400> 66

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn

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355		360		365
Phe Asp Lys Ala Val	Phe Lys Ile Asn Ile Val	Pro Lys Val Asn Tyr		
370	375	380		
Thr Ile Tyr Asp Gly	Phe Asn Leu Arg Asn Thr	Asn Leu Ala Ala Asn		
385	390	395	400	
Phe Asn Gly Gln Asn Thr	Glu Ile Asn Asn Met Asn Phe Thr	Lys Leu		
405	410	415		
Lys Asn Phe Thr Gly Leu	Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg			
420	425	430		
Gly Ile Ile Thr Ser Lys Thr	Lys Ser Leu Asp Asp Asp Asp Lys Gly			
435	440	445		
Tyr Asn Lys Ala Leu Asn Asp	Leu Cys Ile Lys Val Asn Asn Trp Asp			
450	455	460		
Leu Phe Phe Ser Pro Ser	Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys			
465	470	475	480	
Gly Glu Glu Ile Thr Ser Asp Thr	Asn Ile Glu Ala Ala Glu Glu Asn			
485	490	495		
Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr	Leu Thr Phe Asn Phe Asp			
500	505	510		
Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser	Ser Asp Ile Ile			
515	520	525		
Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg	Phe Pro Asn Gly Lys			
530	535	540		
Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr	Leu Arg Ala Gln			
545	550	555	560	
Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr	Asn Ser Val Asn			
565	570	575		
Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe	Ser Ser Asp			
580	585	590		
Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met	Phe Leu Gly			
595	600	605		
Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp	Glu Thr Ser Glu Val			
610	615	620		

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Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile  
 625 630 635 640

Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val  
 645 650 655

Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro  
 660 665 670

Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile  
 675 680 685

Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys  
 690 695 700

Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp  
 705 710 715 720

Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys  
 725 730 735

Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr  
 740 745 750

Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn  
 755 760 765

Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met  
 770 775 780

Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met  
 785 790 795 800

Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala  
 805 810 815

Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr  
 820 825 830

Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu  
 835 840 845

Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg  
 850 855 860

Leu Leu Ser Thr Glu Glu Glu Glu Glu Glu Glu  
 865 870 875

&lt;210&gt; 67

&lt;211&gt; 2850

&lt;212&gt; DNA

<213> *Clostridium botulinum*

&lt;400&gt; 67

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aaaatctggg ttatcccgga acgtgacacc ttcaccaacc cggaagaagg tgacctgaac      180
ccgcgcgcgg aagctaaaca ggttccgggt tcttactacg actctacctt cctgtctacc      240
gacaacgaaa aagacaacta cctgaaaggt gttaccaaac tggtcgaacg tatctactct      300
accgacctgg gtcgtatgct gctgacctct atcggtcgtg gtatcccggt ctgggggtgg      360
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gacgggttctt accgtttctga agaactgaac ctgggttatca tcgggtccgtc tgctgacatc      480
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accgaagctg ctatgttcct gggttggggt gaacagctgg tttacgactt caccgacgaa     1860

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 gctctgtcta aacgtaacga aaaatgggac gaagtttaca aatacatcgt taccaactgg 2160  
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 aactctatga tcccgtacgg tggttaaactg ctggaagact tcgacgcttc tctgaaagac 2460  
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&lt;210&gt; 68

&lt;211&gt; 949

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 68

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365



Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly  
 435 440 445

Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp  
 450 455 460

Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys  
 465 470 475 480

Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn  
 485 490 495

Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp  
 500 505 510

Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile  
 515 520 525

Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys  
 530 535 540

Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln  
 545 550 555 560

Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn  
 565 570 575

Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp  
 580 585 590

Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly  
 595 600 605

Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val  
 610 615 620

Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile

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625		630		635		640
Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val	645		650		655	
Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro	660		665		670	
Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile	675		680		685	
Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys	690		695		700	
Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp	705		710		715	720
Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys	725		730		735	
Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr	740		745		750	
Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn	755		760		765	
Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met	770		775		780	
Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met	785		790		795	800
Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala	805		810		815	
Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr	820		825		830	
Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu	835		840		845	
Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg	850		855		860	
Leu Leu Ser Thr Cys Ile Ser Gly Asp Ser Leu Ile Ser Leu Ala Ser	865		870		875	880
Thr Gly Lys Arg Val Ser Ile Lys Asp Leu Leu Asp Glu Lys Asp Phe	885		890		895	

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Glu Ile Trp Ala Ile Asn Glu Gln Thr Met Lys Leu Glu Ser Ala Lys  
 900 905 910

Val Ser Arg Val Phe Cys Thr Gly Lys Lys Leu Val Tyr Ile Leu Lys  
 915 920 925

Thr Arg Leu Gly Arg Thr Ile Lys Ala Thr Ala Asn His Arg Phe Leu  
 930 935 940

Thr Ile Asp Gly Trp  
 945

<210> 69

<211> 1385

<212> DNA

<213> Clostridium botulinum

<400> 69

ggatccatgg agttcggttaa caaacagttc aactataaag acccagttaa cgggtgttgac	60
attgcttaca tcaaaatccc gaacgctggc cagatgcagc cggtaaaggc attcaaaatc	120
cacaacaaaa tctgggttat cccggaacgt gataccttta ctaaccggga agaaggtgac	180
ctgaaccgcg caccggaagc gaaacaggtg cgggtatctt actatgactc cacctacctg	240
tctaccgata acgaaaagga caactacctg aaaggtgtta ctaaactggt cgagcgtatt	300
tactccaccg acctgggccc tatgctgctg actagcatcg ttcgcggtat ccggttctgg	360
ggcggttcta ccatcgatac cgaactgaaa gtaatcgaca ctaactgcat caacgttatt	420
cagccggacg gttcctatcg ttccgaagaa ctgaacctgg tgatcatcgg ccggtctgct	480
gatatcatcc agttcgagtg taagagcttt ggtcacgaag ttctgaacct caccgtaac	540
ggctacggtt ccaactcagta catccgtttc tctccggact tcaccttcgg ttttgaagaa	600
tccctggaag tagacacgaa cccactgctg ggcgctggta aattcgcaac tgatcctgcg	660
gttaccctgg ctacgaact gattcatgca ggccaccgcc tgtacggtat cgccatcaat	720
ccgaaccgtg tcttcaaagt taacaccaac gcgtattacg agatgtccgg tctggaagta	780
agcttcgaag aactgcgtac ttttggcggg cagcagcta aattcatcga ctctctgcaa	840
gaaaacgagt tccgtctgta ctactataac aagttcaaag atatcgcatc caccctgaac	900
aaagcgaaat ccatcggtggg taccactgct tctctgcagt acatgaagaa cgttttttaa	960
gaaaaatacc tgctcagcga agacacctcc ggcaaattct ctgtagacaa gttgaaattc	1020
gataaacttt acaaaatgct gactgaaatt tacaccgaag acaacttcgt taagttcttt	1080
aaagttctga accgcaaaac ctatctgaac ttcgacaagg cagtattcaa aatcaacatc	1140
gtgccgaaag ttaactacac tatctacgat ggtttcaacc tgcgtaacac caacctggct	1200
gctaatttta acggccagaa caccgaaatc aacaacatga acttcacaaa actgaaaaac	1260
ttcactgggc tggttcgagtt ttacaagctg ctgtgcgtac gtggcatcat tacctccaaa	1320

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actaaatctc tggatgacga tgacaaaggt tataacaaag cgctgaacga cctctgtggg 1380  
tcgac 1385

<210> 70  
<211> 457  
<212> PRT  
<213> Clostridium botulinum

<400> 70

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240  
 Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255  
 Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270  
 Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285  
 Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300  
 Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320  
 Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335  
 Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350  
 Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365  
 Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380  
 Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400  
 Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415  
 Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430  
 Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Asp Asp Asp Lys Gly  
 435 440 445  
 Tyr Asn Lys Ala Leu Asn Asp Leu Cys  
 450 455

<210> 71  
 <211> 1376  
 <212> DNA  
 <213> Clostridium botulinum

- 210 -

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<400> 71
ggatccatgg agttcgttaa caaacagttc aactataaag acccagttaa cgggtgttgac      60
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cacaacaaaa tctggggttat cccggaacgt gataccttta ctaaccggga agaagggtgac      180
ctgaaccgcg caccggaagc gaaacaggtg ccggtatctt actatgactc cacctacctg      240
tctaccgata acgaaaagga caactacctg aaagggtgta ctaaactggt cgagcgtatt      300
tactccaccg acctggggccg tatgctgctg actagcatcg ttcgcggtat cccgttcttg      360
ggcggttcta ccatcgatac cgaactgaaa gtaatcgaca ctaactgcat caacggttatt      420
cagccggacg gttcctatcg ttccgaagaa ctgaacctgg tgatcatcgg cccgtctgct      480
gatatcatcc agttcgagtg taagagcttt ggtcacgaag ttctgaacct caccgtaac      540
ggctacgggt ccactcagta catccgtttc tctccggact tcaccttcgg ttttgaagaa      600
tccctggaag tagacacgaa cccactgctg ggcgctggta aattcgcaac tgatcctgcg      660
gttaccctgg ctacacgaact gattcatgca ggccaccgcc tgtacggtat cgccatcaat      720
ccgaaccgtg tcttcaaagt taacaccaac gcgtattacg agatgtccgg tctggaagta      780
agcttcgaag aactgcgtac ttttgccggg cagcagccta aattcatcga ctctctgcaa      840
gaaaacgagt tccgtctgta ctactataac aagttcaaag atatcgcatc caccctgaac      900
aaagcgaaat ccatcgtagg taccactgct tctctgcagt acatgaagaa cgttttttaa      960
gaaaaatacc tgctcagcga agacacctcc ggcaaattct ctgtagacaa gttgaaattc     1020
gataaacttt acaaaatgct gactgaaatt tacaccgaag acaacttcgt taagttcttt     1080
aaagttctga accgcaaaac ctatctgaac ttcgacaagg cagtattcaa aatcaacatc     1140
gtgccgaaag ttaactacac tatctacgat ggtttcaacc tgcgtaacac caacctggct     1200
gctaatttta acggccagaa cacggaaatc aacaacatga acttcacaaa actgaaaaaac     1260
ttcactggtc tgttcgagtt ttacaagctg ctgtgcgtac gtggcatcat tacctccaaa     1320
actaaatctc tgatagaagg tagaaacaaa gcgctgaacg acctctgtgg gtcgac         1376

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<210> 72
<211> 454
<212> PRT
<213> Clostridium botulinum

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<400> 72

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Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
1           5           10           15

```

```

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
20           25           30

```

```

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
35           40           45

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Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Ile Glu Gly Arg Asn Lys  
435 440 445

Ala Leu Asn Asp Leu Cys  
450

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<210> 73
<211> 1376
<212> DNA
<213> Clostridium botulinum
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<400>	73						
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cacaacaaaa	tctgggttat	cccggaacgt	gataccttta	ctaacccgga	agaaggtgac		180
ctgaacccgc	caccggaagc	gaaacaggtg	ccggtatctt	actatgactc	cacctacctg		240
tctaccgata	acgaaaagga	caactacctg	aaaggtgtta	ctaaactggt	cgagcgtatt		300
tactccaccg	acctgggccg	tatgctgctg	actagcatcg	ttcgcggtat	cccgttctgg		360
ggcggttcta	ccatcgatac	cgaactgaaa	gtaatcgaca	ctaactgcat	caacgttatt		420
cagccggacg	gttcctatcg	ttccgaagaa	ctgaacctgg	tgatcatcgg	cccgtctgct		480
gatatcatcc	agttcgagtg	taagagcttt	ggtcacgaag	ttctgaacct	cacccgtaac		540
ggctacgggt	ccactcagta	catccgtttc	tctccggact	tcaccttcgg	ttttgaagaa		600
tccctggaag	tagacacgaa	cccactgctg	ggcgtggta	aattcgcaac	tgatcctgcg		660
gttacccctg	ctcacgaact	gattcatgca	ggccaccgcc	tgtacggtat	cgccatcaat		720



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ccgaaccgtg tcttcaaagt taacaccaac gcgtattacg agatgtccgg tctggaagta      780
agcttcgaag aactgcgtac ttttgccggt caccgacgta aattcatcga ctctctgcaa      840
gaaaacgagt tccgtctgta ctactataac aagttcaaag atatcgcatc caccctgaac      900
aaagcgaaat ccatcgtggg taccactgct tctctgcagt acatgaagaa cgttttttaa      960
gaaaaatacc tgctcagcga agacacctcc ggcaaattct ctgtagacaa gttgaaattc     1020
gataaacttt acaaaatgct gactgaaatt tacaccgaag acaacttcgt taagttcttt     1080
aaagttctga accgcaaac ctatctgaac ttcgacaagg cagtattcaa aatcaacatc     1140
gtgccgaaag ttaactacac tatctacgat ggtttcaacc tgcgtaacac caacctggct     1200
gctaatttta acggccagaa cacggaaatc aacaacatga acttcacaaa actgaaaaac     1260
ttcactggtc tgttcgagtt ttacaagctg ctgtgcgtac gtggcatcat tacctccaaa     1320
actaaatctc tggacaaagg ttataacaaa gcgctgaacg acctctgtgg gtcgac       1376

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<210> 74
<211> 454
<212> PRT
<213> Clostridium botulinum

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<400> 74

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Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
1           5           10          15

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```

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
          20           25           30

```

```

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
          35           40           45

```

```

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu
          50           55           60

```

```

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr
65           70           75           80

```

```

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu
          85           90           95

```

```

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val
          100          105          110

```

```

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys
          115          120          125

```

```

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr
          130          135          140

```

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Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

- 215 -

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
 435 440 445

Ala Leu Asn Asp Leu Cys  
 450

&lt;210&gt; 75

&lt;211&gt; 1376

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 75

```

ggatccatgg agttcgtaa caaacagttc aactataaag acccagtaa cgggtgttgac      60
attgcttaca tcaaaatccc gaacgctggc cagatgcagc cggtaaaggc attcaaaatc    120
cacaacaaaa tctgggttat cccggaacgt gataccttta ctaacccgga agaagggtgac    180
ctgaacccgc caccggaagc gaaacagggtg ccggtatctt actatgactc cacctacctg    240
tctaccgata acgaaaagga caactacctg aaagggtgta ctaaactggt cgagcgtatt    300
tactccaccg acctggggccg tatgctgctg actagcatcg ttccgcggtat cccgttctgg    360
ggcgggttcta ccatcgatac cgaactgaaa gtaatcgaca ctaactgcat caacggttatt    420
cagccggacg gttcctatcg ttccgaagaa ctgaacctgg tgatcatcgg cccgtctgct    480
gatatcatcc agttcgagtg taagagcttt ggtcacgaag ttctgaacct caccgtaac    540
ggctacggtt ccaactcagta catccgtttc tctccggact tcaccttcgg ttttgaagaa    600
tccctggaag tagacacgaa cccactgctg ggcgctggta aattcgcaac tgatcctgcg    660
gttacacctg ctcacgaact gattcatgca ggccaccgcc tgtacggtat cgccatcaat    720
ccgaaccgtg tcttcaaagt taacaccaac gcgtattacg agatgtccgg tctggaagta    780
agcttcgaag aactgcgtac ttttggcggt cacgacgcta aattcatcga ctctctgcaa    840
gaaaacgagt tccgtctgta ctactataac aagttcaaag atatcgcatc caccctgaac    900
aaagcgaaat ccatcgtggg taccactgct tctctgcagt acatgaagaa cgttttttaa    960
gaaaaatacc tgctcagcga agacacctcc ggcaaattct ctgtagacaa gttgaaattc   1020
gataaacttt acaaaatgct gactgaaatt tacaccgaag acaacttcgt taagttcttt   1080
aaagttctga accgcaaaac ctatctgaac ttcgacaagg cagtattcaa aatcaacatc   1140
gtgccgaaag ttaactacac tatctacgat ggtttcaacc tgcgtaacac caacctggct   1200
gctaatttta acggccagaa cacggaaatc aacaacatga acttcacaaa actgaaaaac   1260
ttcactggtc tggtcgagtt ttacaagctg ctgtgcgtac gtggcatcat tacctccaaa   1320
ttagaagttt tattccaagg acctaacaaa gcgctgaacg acctctgtgg gtcgac      1376

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<210> 76  
 <211> 454  
 <212> PRT  
 <213> Clostridium botulinum

<400> 76

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
 1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
420 425 430

Gly Ile Ile Thr Ser Lys Leu Glu Val Leu Phe Gln Gly Pro Asn Lys  
435 440 445

Ala Leu Asn Asp Leu Cys  
450

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<210> 77
<211> 1376
<212> DNA
<213> Clostridium botulinum
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<400> 77  
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attgcttaca tcaaaatccc gaacgctggc cagatgcagc cggtaaaaggc attcaaaatc 120

- 218 -

cacaacaaaa tctgggttat cccggaacgt gataccttta ctaacccgga agaaggtgac 180  
ctgaacccgc caccggaagc gaaacaggtg ccggtatctt actatgactc cacctacctg 240  
tctaccgata acgaaaagga caactacctg aaaggtgtta ctaaactggt cgagcgtatt 300  
tactccaccg acctgggccg tatgctgctg actagcatcg ttcgcggtat cccgttctgg 360  
ggcggttcta ccatcgatac cgaactgaaa gtaatcgaca ctaactgcat caacgttatt 420  
cagccggacg gttcctatcg ttccgaagaa ctgaacctgg tgatcatcgg cccgtctgct 480  
gatatcatcc agttcgagtg taagagcttt ggtcacgaag ttctgaacct caccgtaac 540  
ggctacgggt cactcagta catccgttct tctccggact tcaccttcgg ttttgaagaa 600  
tccttggaa tagacacgaa cccactgctg ggcgctggta aattcgcaac tgatcctgcg 660  
gttaccctgg ctacgaact gattcatgca ggccaccgcc tgtacgggtat cgccatcaat 720  
ccgaaccgtg tcttcaaagt taacaccaac gcgtattacg agatgtccgg tctggaagta 780  
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gaaaacgagt tccgtctgta ctactataac aagttcaaag atatcgcatc caccctgaac 900  
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&lt;210&gt; 78

&lt;211&gt; 454

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 78

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
50 55 60

- 219 -

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
325 330 335

- 220 -

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Leu Val Pro Arg Gly Ser Asn Lys  
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Ala Leu Asn Asp Leu Cys  
 450

<210> 79  
 <211> 2601  
 <212> DNA  
 <213> Clostridium botulinum

<400> 79  
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 aaggctttta agatcaccga ccgtatcttg atcatcccg aacggttacac cttcggttac 180  
 aaacctgagg acttcaacaa gagtagcggg attttcaatc gtgacgtctg cgagtactat 240  
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 ctcttcaacc gtatcaaaag caaacgcgtc ggtgaaaaac tcctcgaaat gattatcaac 360  
 ggtatcccggt acctcgggtga ccgtcgtgtc ccgcttgaag agttcaacac caacatcgca 420  
 agcgtcaccg tcaacaaact catcagcaac ccagggtgaag tcgaacgtaa aaaaggatc 480  
 ttcgcaaacc tcatcatctt cggtcgggt ccggctctca acgaaaacga aaccatcgac 540  
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 gtcctccacg gtctctacgg tatcaaagtt gacgacctcc cgatcgtccc gaacgagaag 780  
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atgttcaaca aatacaacag c 2601

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&lt;210&gt; 80

&lt;211&gt; 867

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

- 222 -

&lt;400&gt; 80

Ile Ser Glu Phe Gly Ser Met Pro Val Thr Ile Asn Asn Phe Asn Tyr  
 1 5 10 15

Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe  
 20 25 30

Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
 85 90 95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
 100 105 110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
 115 120 125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
 130 135 140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
 145 150 155 160

Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

- 223 -

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
 290 295 300

Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
 305 310 315 320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
 325 330 335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
 340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
 355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
 370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
 385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
 405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
 420 425 430

Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Asp Asp Asp  
 435 440 445

Asp Lys Ala Pro Gly Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe  
 450 455 460

Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu  
 465 470 475 480

Arg Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro  
 485 490 495

Ile Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu  
 500 505 510

Pro Arg Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro  
 515 520 525

- 224 -

Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn  
 530 535 540

Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg  
 545 550 555 560

Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn  
 565 570 575

Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys  
 580 585 590

Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn  
 595 600 605

Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala  
 610 615 620

Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly  
 625 630 635 640

Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly  
 645 650 655

Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val  
 660 665 670

Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile  
 675 680 685

Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp  
 690 695 700

Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln  
 705 710 715 720

Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala  
 725 730 735

Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu  
 740 745 750

Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys  
 755 760 765

Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile  
 770 775 780

Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala

- 225 -

785		790		795		800									
Val	Glu	Lys	Leu	Leu	Asp	Phe	Asp	Asn	Thr	Leu	Lys	Lys	Asn	Leu	Leu
			805						810					815	
Asn	Tyr	Ile	Asp	Glu	Asn	Lys	Leu	Tyr	Leu	Ile	Gly	Ser	Ala	Glu	Tyr
			820					825					830		
Glu	Lys	Ser	Lys	Val	Asn	Lys	Tyr	Leu	Lys	Thr	Ile	Met	Pro	Phe	Asp
		835					840					845			
Leu	Ser	Ile	Tyr	Thr	Asn	Asp	Thr	Ile	Leu	Ile	Glu	Met	Phe	Asn	Lys
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Tyr	Asn	Ser													
865															

<210> 81  
 <211> 2628  
 <212> DNA  
 <213> Clostridium botulinum

<400> 81  
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 aaggctttta agatcaccca ccgtatctgg atcatcccgg aacgtttacac cttcggttac 180  
 aaacctgagg acttcaacaa gagtagcggg attttcaatc gtgacgtctg cgagtactat 240  
 gatccagatt atctgaatac caacgataag aagaacatat tccttcagac tatgattaaa 300  
 ctcttcaacc gtatcaaaag caaacgcgc ggtgaaaaac tcctcgaaat gattatcaac 360  
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 gaaggcaa at acagcatcga cgtagaaagt ttcgacaagc tctacaaaag cctcatgttc 1080  
 ggtttcaccg aaaccaacat cgccgagaac tacaagatca agacaagggc aagttacttc 1140

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tacaccaacg acaccatcct gatcgaaatg ttcaacaaat acaacagc 2628

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&lt;210&gt; 82

&lt;211&gt; 876

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 82

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Ile Ser Glu Phe Gly Ser Met Pro Val Thr Ile Asn Asn Phe Asn Tyr
1           5           10           15

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Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe
20           25           30

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- 227 -

Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
 85 90 95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
 100 105 110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
 115 120 125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
 130 135 140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
 145 150 155 160

Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
 290 295 300

- 228 -

Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
305 310 315 320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
325 330 335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
420 425 430

Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Glu Glu Lys  
435 440 445

Leu Tyr Asp Asp Asp Asp Lys Asp Arg Trp Gly Ser Ser Arg Ile Cys  
450 455 460

Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser  
465 470 475 480

Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln  
485 490 495

Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp  
500 505 510

Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Arg Glu Asn Thr Glu Ser  
515 520 525

Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala  
530 535 540

Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr  
545 550 555 560

Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser



- 229 -

565										570					575				
Phe	Asp	Asp	Ala	Leu	Leu	Phe	Ser	Asn	Lys	Val	Tyr	Ser	Phe	Phe	Ser				
			580					585					590						
Met	Asp	Tyr	Ile	Lys	Thr	Ala	Asn	Lys	Val	Val	Glu	Ala	Gly	Leu	Phe				
		595					600					605							
Ala	Gly	Trp	Val	Lys	Gln	Ile	Val	Asn	Asp	Phe	Val	Ile	Glu	Ala	Asn				
	610					615					620								
Lys	Ser	Asn	Thr	Met	Asp	Lys	Ile	Ala	Asp	Ile	Ser	Leu	Ile	Val	Pro				
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Tyr	Ile	Gly	Leu	Ala	Leu	Asn	Val	Gly	Asn	Glu	Thr	Ala	Lys	Gly	Asn				
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Phe	Glu	Asn	Ala	Phe	Glu	Ile	Ala	Gly	Ala	Ser	Ile	Leu	Leu	Glu	Phe				
			660					665					670						
Ile	Pro	Glu	Leu	Leu	Ile	Pro	Val	Val	Gly	Ala	Phe	Leu	Leu	Glu	Ser				
		675					680					685							
Tyr	Ile	Asp	Asn	Lys	Asn	Lys	Ile	Ile	Lys	Thr	Ile	Asp	Asn	Ala	Leu				
	690					695					700								
Thr	Lys	Arg	Asn	Glu	Lys	Trp	Ser	Asp	Met	Tyr	Gly	Leu	Ile	Val	Ala				
705					710					715					720				
Gln	Trp	Leu	Ser	Thr	Val	Asn	Thr	Gln	Phe	Tyr	Thr	Ile	Lys	Glu	Gly				
				725					730					735					
Met	Tyr	Lys	Ala	Leu	Asn	Tyr	Gln	Ala	Gln	Ala	Leu	Glu	Glu	Ile	Ile				
			740				745						750						
Lys	Tyr	Arg	Tyr	Asn	Ile	Tyr	Ser	Glu	Lys	Glu	Lys	Ser	Asn	Ile	Asn				
		755					760					765							
Ile	Asp	Phe	Asn	Asp	Ile	Asn	Ser	Lys	Leu	Asn	Glu	Gly	Ile	Asn	Gln				
	770					775					780								
Ala	Ile	Asp	Asn	Ile	Asn	Asn	Phe	Ile	Asn	Gly	Cys	Ser	Val	Ser	Tyr				
785					790					795					800				
Leu	Met	Lys	Lys	Met	Ile	Pro	Leu	Ala	Val	Glu	Lys	Leu	Leu	Asp	Phe				
				805					810					815					
Asp	Asn	Thr	Leu	Lys	Lys	Asn	Leu	Leu	Asn	Tyr	Ile	Asp	Glu	Asn	Lys				
			820				825						830						

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Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys  
 835 840 845

Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp  
 850 855 860

Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser  
 865 870 875

<210> 83  
 <211> 2613  
 <212> DNA  
 <213> Clostridium botulinum

<400> 83  
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 accggacgtt actacaaggc ttttaagatc accgaccgta tctggatcat cccggaacgt 180  
 tacaccttcg gttacaaacc tgaggacttc aacaagagta gcgggatttt caatcgtgac 240  
 gtctgcgagt actatgatcc agattatctg aataccaacg ataagaagaa catattcctt 300  
 cagactatga ttaaactcct caaccgtatc aaaagcaaac cgctcgggtga aaaactcctc 360  
 gaaatgatta tcaacgggat cccgtacctc ggtgaccgtc gtgtcccgt tgaagagttc 420  
 aacaccaaca tcgcaagcgt caccgtcaac aaactcatca gcaaccagg tgaagtcgaa 480  
 cgtaaaaaaag gtatcttcgc aaacctcatc atcttcggtc cgggtccggt cctcaacgaa 540  
 aacgaaacca tcgacatcgg tatccagaac cacttcgcaa gccgtgaagg tttcggtggt 600  
 atcatgcaga tgaaattctg cccggaatac gtcagtgtct tcaacaacgt ccaggaaaac 660  
 aaaggtgcaa gcatcttcaa ccgtcgtggt tacttcagcg acccggcact catcctcatg 720  
 catgaactca tccacgtcct ccacggtctc tacggtatca aagttgacga cctcccgatc 780  
 gtcccgaacg agaagaaatt cttcatgcag agcaccgacg caatccaggc tgaggaaactc 840  
 tacaccttcg gtggccaaga cccaagtatc ataaccccggt ccaccgacaa aagcatctac 900  
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 ttcgtcgagg acagcgaagg caaatacagc atcgacgtag aaagtttcga caagctctac 1080  
 aaaagcctca tgttcggttt caccgaaacc aacatcgccg agaactacaa gatcaagaca 1140  
 agggcaagtt acttcagcga cagcctcccc cctgtcaaaa tcaagaacct cttagacaac 1200  
 gagatttaca ctatagaaga gggcttcaac atcagtgaca aagacatgga gaaggaatac 1260  
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 gcagtctaca agatccagat gtgtagcgct atcgaaggcc gagctccccg gatctgcac 1380  
 gacgttgaca acgaagacct gttcttcac gctgacaaaa acagcttcag tgacgacctg 1440

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agcaaaaacg aacgtatcga atacaacacc cagagcaact acatcgaaaa cgacttccccg 1500  
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 aagaaaatct tcaccgacga aaacaccatc ttccagtacc tgtacagcca gaccttccccg 1680  
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 gggctgttcg ctggttgggt taaacagatc gttaacgact tcgttatcga agctaacaaa 1860  
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<210> 84  
 <211> 871  
 <212> PRT  
 <213> Clostridium botulinum

<400> 84

Gly Arg Ala Met Gly Gly Arg Glu Phe Gly Ser Met Pro Val Thr Ile  
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Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met  
 20 25 30

Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe  
 35 40 45

Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly  
 50 55 60

Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp  
 65 70 75 80



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340	345	350
Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr 355 360 365		
Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr 370 375 380		
Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn 385 390 395 400		
Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met 405 410 415		
Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr 420 425 430		
Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys 435 440 445		
Ser Ala Ile Glu Gly Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn 450 455 460		
Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu 465 470 475 480		
Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu 485 490 495		
Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser 500 505 510		
Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn 515 520 525		
Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe 530 535 540		
Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro 545 550 555 560		
Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu 565 570 575		
Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys 580 585 590		
Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys 595 600 605		

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Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met  
 610 615 620

Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala  
 625 630 635 640

Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe  
 645 650 655

Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu  
 660 665 670

Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys  
 675 680 685

Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu  
 690 695 700

Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr  
 705 710 715 720

Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu  
 725 730 735

Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn  
 740 745 750

Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp  
 755 760 765

Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile  
 770 775 780

Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met  
 785 790 795 800

Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys  
 805 810 815

Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly  
 820 825 830

Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile  
 835 840 845

Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu  
 850 855 860

Met Phe Asn Lys Tyr Asn Ser  
 865 870

<210> 85  
 <211> 2613  
 <212> DNA  
 <213> *Clostridium botulinum*

<400> 85  
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 cagactatga ttaaactcct caaccgtatc aaaagcaaac cgctcggtga aaaactcctc 360  
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 cgtaaaaaag gtatcttcgc aaacctcatc atcttcggtc cgggtccggt cctcaacgaa 540  
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 atcaacgaac tgatcctgga caccgacctg ataagtaaaa tcgaactgcc gagcgaaaac 1560  
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 aagaaaatct tcaccgacga aaacaccatc ttccagtacc tgtacagcca gaccttcccg 1680  
 ctggacatcc gtgacatcag tctgaccagc agtttcgacg acgctctgct gttcagcaac 1740  
 aaagtttaca gtttcttcag catggactac atcaaaaccg ctaacaaagt tggtgaagca 1800

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atcctgatcg aaatgttcaa caaatacaac agc 2613

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<210> 86  
 <211> 871  
 <212> PRT  
 <213> Clostridium botulinum

<400> 86

Gly Ile Glu Gly Arg Ile Ser Glu Phe Gly Ser Met Pro Val Thr Ile  
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Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met  
 20 25 30

Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe  
 35 40 45

Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly  
 50 55 60

Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp  
 65 70 75 80

Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys  
 85 90 95

Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser  
 100 105 110

Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro  
 115 120 125



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Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile  
 130 135 140

Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu  
 145 150 155 160

Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro  
 165 170 175

Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe  
 180 185 190

Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro  
 195 200 205

Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser  
 210 215 220

Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met  
 225 230 235 240

His Glu Leu Ile His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp  
 245 250 255

Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr  
 260 265 270

Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro  
 275 280 285

Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu  
 290 295 300

Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys  
 305 310 315 320

Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys  
 325 330 335

Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp  
 340 345 350

Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr  
 355 360 365

Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr  
 370 375 380

Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn

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385		390		395		400
Glu Ile Tyr Thr	Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met					
	405		410			415
Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr						
	420		425			430
Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys						
	435		440			445
Ser Ala Ile Glu Gly Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn						
	450		455			460
Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu						
	465		470		475	480
Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu						
		485		490		495
Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser						
	500		505			510
Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn						
	515		520			525
Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe						
	530		535			540
Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro						
	545		550		555	560
Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu						
		565		570		575
Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys						
	580		585			590
Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys						
	595		600			605
Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met						
	610		615			620
Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala						
	625		630		635	640
Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe						
		645		650		655

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Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu  
660 665 670

Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys  
675 680 685

Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu  
690 695 700

Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr  
705 710 715 720

Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu  
725 730 735

Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn  
740 745 750

Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp  
755 760 765

Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile  
770 775 780

Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met  
785 790 795 800

Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys  
805 810 815

Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly  
820 825 830

Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile  
835 840 845

Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu  
850 855 860

Met Phe Asn Lys Tyr Asn Ser  
865 870

&lt;210&gt; 87

&lt;211&gt; 2598

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 87

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<210> 88  
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 <212> PRT  
 <213> Clostridium botulinum

<400> 88

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Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe  
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Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
 85 90 95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
 100 105 110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
 115 120 125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
 130 135 140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
 145 150 155 160

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Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
 290 295 300

Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
 305 310 315 320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
 325 330 335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
 340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
 355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
 370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
 385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
 405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
 420 425 430

Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Ser Ala Ile Glu Gly  
 435 440 445

Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe  
 450 455 460

Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg  
 465 470 475 480

Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile  
 485 490 495

Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro  
 500 505 510

Ser Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val  
 515 520 525

Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr  
 530 535 540

Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp  
 545 550 555 560

Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys  
 565 570 575

Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val  
 580 585 590

Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp  
 595 600 605

Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp  
 610 615 620

Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn  
 625 630 635 640

Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala  
 645 650 655

Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly  
 660 665 670

Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys  
 675 680 685

Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met

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690                                      695                                      700  
 Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe  
 705                                      710                                      715                                      720  
 Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln  
                                     725                                      730                                      735  
 Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys  
                                     740                                      745                                      750  
 Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu  
                                     755                                      760                                      765  
 Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn  
                                     770                                      775                                      780  
 Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val  
 785                                      790                                      795                                      800  
 Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn  
                                     805                                      810                                      815  
 Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu  
                                     820                                      825                                      830  
 Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu  
                                     835                                      840                                      845  
 Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr  
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 Asn Ser  
 865

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 <211> 2613  
 <212> DNA  
 <213> Clostridium botulinum

<400> 89  
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 accggacgtt actacaaggc ttttaagatc accgaccgta tctggatcat cccggaacgt 180  
 tacaccttcg gttacaaacc tgaggacttc aacaagagta gcgggatttt caatcgtgac 240  
 gtctgcgagt actatgatcc agattatctg aataccaacg ataagaagaa catattcctt 300  
 cagactatga ttaaaactctt caaccgtatc aaaagcaaac cgctcgggtga aaaactcctc 360  
 gaaatgatta tcaacggtat cccgtacctc ggtgaccgtc gtgtcccgt tgaagagttc 420



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cgtaaaaaag	gtatcttcgc	aaacctcatc	atcttcggtc	cgggtccggt	cctcaacgaa	540
aacgaaacca	tcgacatcgg	tatccagaac	cacttcgcaa	gccgtgaagg	tttcggtggt	600
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aaacgtaacg	aaaaatggag	tgatatgtac	ggctctgatcg	ttgctcagtg	gctgagcacc	2160
gtcaacaccc	agttctacac	catcaaagaa	ggatatgtaca	aagctctgaa	ctaccaggct	2220
caggctctgg	aagagatcat	caaataccgt	tacaacatct	acagtgagaa	ggaaaagagt	2280
aacatcaaca	tcgacttcaa	cgacatcaac	agcaaaactga	acgaaggat	caaccaggct	2340
atcgacaaca	tcaacaactt	catcaacggt	tgcagtgtta	gctacctgat	gaagaagatg	2400

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<210> 90  
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 <212> PRT  
 <213> Clostridium botulinum

<400> 90

Asp Asp Asp Asp Lys Ile Ser Glu Phe Gly Ser Met Pro Val Thr Ile  
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Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met-  
 20 25 30

Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe  
 35 40 45

Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly  
 50 55 60

Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp  
 65 70 75 80

Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys  
 85 90 95

Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser  
 100 105 110

Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro  
 115 120 125

Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile  
 130 135 140

Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu  
 145 150 155 160

Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro  
 165 170 175

Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe  
 180 185 190

Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro  
 195 200 205

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Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser  
 210 215 220

Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met  
 225 230 235 240

His Glu Leu Ile His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp  
 245 250 255

Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr  
 260 265 270

Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro  
 275 280 285

Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu  
 290 295 300

Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys  
 305 310 315 320

Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys  
 325 330 335

Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp  
 340 345 350

Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr  
 355 360 365

Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr  
 370 375 380

Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn  
 385 390 395 400

Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met  
 405 410 415

Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr  
 420 425 430

Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys  
 435 440 445

Ser Ala Ile Glu Gly Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn  
 450 455 460

Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu

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465		470		475		480									
Ser	Lys	Asn	Glu	Arg	Ile	Glu	Tyr	Asn	Thr	Gln	Ser	Asn	Tyr	Ile	Glu
				485					490					495	
Asn	Asp	Phe	Pro	Ile	Asn	Glu	Leu	Ile	Leu	Asp	Thr	Asp	Leu	Ile	Ser
			500					505					510		
Lys	Ile	Glu	Leu	Pro	Ser	Glu	Asn	Thr	Glu	Ser	Leu	Thr	Asp	Phe	Asn
		515					520					525			
Val	Asp	Val	Pro	Val	Tyr	Glu	Lys	Gln	Pro	Ala	Ile	Lys	Lys	Ile	Phe
		530				535					540				
Thr	Asp	Glu	Asn	Thr	Ile	Phe	Gln	Tyr	Leu	Tyr	Ser	Gln	Thr	Phe	Pro
545					550					555					560
Leu	Asp	Ile	Arg	Asp	Ile	Ser	Leu	Thr	Ser	Ser	Phe	Asp	Asp	Ala	Leu
				565					570					575	
Leu	Phe	Ser	Asn	Lys	Val	Tyr	Ser	Phe	Phe	Ser	Met	Asp	Tyr	Ile	Lys
			580					585					590		
Thr	Ala	Asn	Lys	Val	Val	Glu	Ala	Gly	Leu	Phe	Ala	Gly	Trp	Val	Lys
		595					600					605			
Gln	Ile	Val	Asn	Asp	Phe	Val	Ile	Glu	Ala	Asn	Lys	Ser	Asn	Thr	Met
	610					615					620				
Asp	Lys	Ile	Ala	Asp	Ile	Ser	Leu	Ile	Val	Pro	Tyr	Ile	Gly	Leu	Ala
625					630					635					640
Leu	Asn	Val	Gly	Asn	Glu	Thr	Ala	Lys	Gly	Asn	Phe	Glu	Asn	Ala	Phe
				645					650					655	
Glu	Ile	Ala	Gly	Ala	Ser	Ile	Leu	Leu	Glu	Phe	Ile	Pro	Glu	Leu	Leu
			660					665					670		
Ile	Pro	Val	Val	Gly	Ala	Phe	Leu	Leu	Glu	Ser	Tyr	Ile	Asp	Asn	Lys
		675					680					685			
Asn	Lys	Ile	Ile	Lys	Thr	Ile	Asp	Asn	Ala	Leu	Thr	Lys	Arg	Asn	Glu
	690					695					700				
Lys	Trp	Ser	Asp	Met	Tyr	Gly	Leu	Ile	Val	Ala	Gln	Trp	Leu	Ser	Thr
705						710				715					720
Val	Asn	Thr	Gln	Phe	Tyr	Thr	Ile	Lys	Glu	Gly	Met	Tyr	Lys	Ala	Leu
				725					730					735	

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Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn  
740 745 750

Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp  
755 760 765

Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile  
770 775 780

Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met  
785 790 795 800

Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys  
805 810 815

Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly  
820 825 830

Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile  
835 840 845

Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu  
850 855 860

Met Phe Asn Lys Tyr Asn Ser  
865 870

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<211> 2610  
<212> DNA  
<213> Clostridium botulinum

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ggtgcaagca tcttcaaccg tcgtggttac ttcagcgacc cggcactcat cctcatgcat 720

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ctgatcgaaa	tggttcaacaa	atacaacagc				2610

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&lt;211&gt; 870

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 92

Ile Glu Gly Arg Ile Ser Glu Phe Gly Ser Met Pro Val Thr Ile Asn  
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Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met  
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Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys  
35 40 45

Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr  
50 55 60

Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val  
65 70 75 80

Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn  
85 90 95

Ile Phe Leu Gln Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys  
100 105 110

Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr  
115 120 125

Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala  
130 135 140

Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg  
145 150 155 160

Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val  
165 170 175

Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala  
180 185 190

Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu  
195 200 205

Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile  
210 215 220

Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His  
225 230 235 240





Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val  
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Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr  
 530 535 540

Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu  
 545 550 555 560

Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu  
 565 570 575

Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr  
 580 585 590

Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln  
 595 600 605

Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp  
 610 615 620

Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu  
 625 630 635 640

Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu  
 645 650 655

Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile  
 660 665 670

Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn  
 675 680 685

Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys  
 690 695 700

Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val  
 705 710 715 720

Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn  
 725 730 735

Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile  
 740 745 750

Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile  
 755 760 765

Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn

770                                      775                                      780

Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile  
 785                                      790                                      795                                      800

Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys  
                                     805                                      810                                      815

Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser  
                                     820                                      825                                      830

Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met  
                                     835                                      840                                      845

Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met  
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Phe Asn Lys Tyr Asn Ser  
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 <212> DNA  
 <213> Clostridium botulinum

<400> 93

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- 255 -

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&lt;210&gt; 94

&lt;211&gt; 862

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 94

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Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr  
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Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile  
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Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser  
 50 55 60

Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr  
 65 70 75 80

Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys  
 85 90 95

Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu  
 100 105 110

Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu  
 115 120 125

Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile  
 130 135 140

Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu  
 145 150 155 160

Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp  
 165 170 175

Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile  
 180 185 190

Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val  
 195 200 205

Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser  
 210 215 220

Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly  
 225 230 235 240

Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys  
 245 250 255

Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr  
 260 265 270

Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys  
 275 280 285

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Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg  
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Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn  
 305 310 315 320

Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser  
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Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys  
 340 345 350

Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys  
 355 360 365

Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys  
 370 375 380

Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe  
 385 390 395 400

Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys  
 405 410 415

Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala  
 420 425 430

Val Tyr Lys Ile Gln Met Cys Ser Ala Ile Glu Gly Arg Ala Pro Gly  
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Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys  
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Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn  
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Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile  
 485 490 495

Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr  
 500 505 510

Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln  
 515 520 525

Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr  
 530 535 540

Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr

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Ser Ser Phe Asp	Asp 565	Ala Leu Leu Phe	Ser 570	Asn Lys Val Tyr	Ser 575	Phe
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Leu Phe Ala Gly	Trp 595	Val Lys Gln Ile	Val 600	Asn Asp Phe	Val 605	Ile Glu
Ala Asn Lys Ser	Asn 610	Thr Met Asp	Lys 615	Ile Ala Asp	Ile 620	Ser Leu Ile
Val Pro Tyr Ile	Gly 625	Leu Ala Leu	Asn 630	Val Gly Asn	Glu 635	Thr Ala Lys
Gly Asn Phe Glu	Asn 645	Ala Phe Glu	Ile 650	Ala Gly Ala	Ser 655	Ile Leu Leu
Glu Phe Ile Pro	Glu 660	Leu Leu Ile	Pro 665	Val Val Gly	Ala 670	Phe Leu Leu
Glu Ser Tyr Ile	Asp 675	Asn Lys Asn	Lys 680	Ile Ile Lys	Thr 685	Ile Asp Asn
Ala Leu Thr Lys	Arg 690	Asn Glu Lys	Trp 695	Ser Asp Met	Tyr 700	Gly Leu Ile
Val Ala Gln Trp	Leu 705	Ser Thr Val	Asn 710	Thr Gln Phe	Tyr 715	Thr Ile Lys
Glu Gly Met Tyr	Lys 725	Ala Leu Asn	Tyr 730	Gln Ala Gln	Ala 735	Leu Glu Glu
Ile Ile Lys Tyr	Arg 740	Tyr Asn Ile	Tyr 745	Ser Glu Lys	Glu 750	Lys Ser Asn
Ile Asn Ile Asp	Phe 755	Asn Asp Ile	Asn 760	Ser Lys Leu	Asn 765	Glu Gly Ile
Asn Gln Ala Ile	Asp 770	Asn Ile Asn	Asn 775	Phe Ile Asn	Gly 780	Cys Ser Val
Ser Tyr Leu Met	Lys 785	Lys Met Ile	Pro 790	Leu Ala Val	Glu 795	Lys Leu Leu
Asp Phe Asp Asn	Thr 805	Leu Lys Lys	Asn 810	Leu Leu Asn	Tyr 815	Ile Asp Glu

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Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val  
820 825 830

Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr  
835 840 845

Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser  
850 855 860

&lt;210&gt; 95

&lt;211&gt; 2601

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 95

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 <213> Clostridium botulinum

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Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp  
 35 40 45

Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu  
 50 55 60

Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr  
 65 70 75 80



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Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu  
 85 90 95

Gln Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly  
 100 105 110

Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp  
 115 120 125

Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr  
 130 135 140

Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly  
 145 150 155 160

Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu  
 165 170 175

Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu  
 180 185 190

Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser  
 195 200 205

Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg  
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Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile  
 225 230 235 240

His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile  
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Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln  
 260 265 270

Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr  
 275 280 285

Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg  
 290 295 300

Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro  
 305 310 315 320

Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys  
 325 330 335

Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe

- 262 -

340	345	350
Asp Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile		
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370	375	380
Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr		
385	390	395
Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr		
	405	410
Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser		
	420	425
Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Ser Ala Ile Glu		
	435	440
Gly Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe		
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Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu		
465	470	475
Arg Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro		
	485	490
Ile Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu		
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Pro Ser Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro		
	515	520
Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn		
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Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg		
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Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn		
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Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys		
	580	585
Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn		
	595	600
		605

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Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala  
 610 615 620

Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly  
 625 630 635 640

Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly  
 645 650 655

Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val  
 660 665 670

Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile  
 675 680 685

Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp  
 690 695 700

Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln  
 705 710 715 720

Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala  
 725 730 735

Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu  
 740 745 750

Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys  
 755 760 765

Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile  
 770 775 780

Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala  
 785 790 795 800

Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu  
 805 810 815

Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr  
 820 825 830

Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp  
 835 840 845

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Tyr Asn Ser  
 865

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&lt;210&gt; 98

&lt;211&gt; 867

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 98

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Tyr Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro  
20 25 30

Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp  
35 40 45

Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu  
50 55 60

Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr  
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Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu  
85 90 95

Gln Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly  
100 105 110

Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp  
115 120 125

Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr  
 130 135 140  
 Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly  
 145 150 155 160  
 Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu  
 165 170 175  
 Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu  
 180 185 190  
 Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser  
 195 200 205  
 Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg  
 210 215 220  
 Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile  
 225 230 235 240  
 His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile  
 245 250 255  
 Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln  
 260 265 270  
 Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr  
 275 280 285  
 Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg  
 290 295 300  
 Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro  
 305 310 315 320  
 Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys  
 325 330 335  
 Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe  
 340 345 350  
 Asp Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile  
 355 360 365  
 Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser  
 370 375 380  
 Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr

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385		390		395		400
Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr	405		410		415	
Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser	420		425		430	
Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Ser Ala Ile Glu	435		440		445	
Gly Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe	450		455		460	
Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu	465		470		475	480
Arg Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro	485		490		495	
Ile Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu	500		505		510	
Pro Ser Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro	515		520		525	
Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn	530		535		540	
Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg	545		550		555	560
Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn	565		570		575	
Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys	580		585		590	
Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn	595		600		605	
Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala	610		615		620	
Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly	625		630		635	640
Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly	645		650		655	

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Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val  
660 665 670

Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile  
675 680 685

Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp  
690 695 700

Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln  
705 710 715 720

Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala  
725 730 735

Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu  
740 745 750

Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys  
755 760 765

Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile  
770 775 780

Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala  
785 790 795 800

Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu  
805 810 815

Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr  
820 825 830

Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp  
835 840 845

Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys  
850 855 860

Tyr Asn Ser  
865

<210> 99

<211> 2595

<212> DNA

<213> Clostridium botulinum

<400> 99

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gacaacaaca acatcattat gatggaaccg ccgttcgcac gtggtaccgg acgttactac 120



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aacaaatata acagc 2595

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<210> 100
<211> 865
<212> PRT
<213> Clostridium botulinum

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<400> 100

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1          5          10          15

```

```

Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe
20          25          30

```

```

Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg
35          40          45

```

```

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp
50          55          60

```

```

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr
65          70          75          80

```

```

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln
85          90          95

```

```

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu
100          105          110

```

```

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg
115          120          125

```

```

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val
130          135          140

```

```

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile
145          150          155          160

```

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Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
 290 295 300

Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
 305 310 315 320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
 325 330 335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
 340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
 355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
 370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
 385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
 405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
 420 425 430

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Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Gly Leu Val Pro Arg  
 435 440 445

Gly Ser Gly Pro Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile  
 450 455 460

Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile  
 465 470 475 480

Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn  
 485 490 495

Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Arg  
 500 505 510

Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr  
 515 520 525

Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile  
 530 535 540

Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile  
 545 550 555 560

Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys Val  
 565 570 575

Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val  
 580 585 590

Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe  
 595 600 605

Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile  
 610 615 620

Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu  
 625 630 635 640

Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser  
 645 650 655

Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala  
 660 665 670

Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr  
 675 680 685

Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr

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690                                      695                                      700  
 Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr  
 705                                      710                                      715                                      720  
 Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala  
                                     725                                      730                                      735  
 Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu  
                                     740                                      745                                      750  
 Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn  
                                     755                                      760                                      765  
 Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly  
                                     770                                      775                                      780  
 Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu  
 785                                      790                                      795                                      800  
 Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr  
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 Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys  
                                     820                                      825                                      830  
 Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser  
                                     835                                      840                                      845  
 Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn  
                                     850                                      855                                      860  
 Ser  
 865

&lt;210&gt; 101

&lt;211&gt; 2592

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 101

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gacatcaaca	gcaaactgaa	cgaaggatc	aaccaggcta	tcgacaacat	caacaacttc	2340
atcaacgggt	gcagtgttag	ctacctgatg	aagaagatga	tcccgtggc	tggtgaaaaa	2400

- 275 -

ctgctggact tcgacaacac cctgaaaaag aacctgctga actacatcga cgaaaacaag 2460  
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 <212> PRT  
 <213> Clostridium botulinum

<400> 102

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Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
 85 90 95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
 100 105 110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
 115 120 125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
 130 135 140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
 145 150 155 160

Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

- 276 -

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
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Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
 305 310 315 320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
 325 330 335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
 340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
 355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
 370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
 385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
 405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
 420 425 430

Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Glu Asn Leu Tyr Phe  
 435 440 445

Gln Gly Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala  
 450 455 460

Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu



465		470		475		480
Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu						
	485			490		495
Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Arg Glu						
	500			505		510
Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu						
	515			520		525
Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe						
	530			535		540
Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser						
	545			550		555
Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr						
	565			570		575
Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu						
	580			585		590
Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val						
	595			600		605
Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser						
	610			615		620
Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr						
	625			630		635
Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile						
	645			650		655
Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe						
	660			665		670
Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile						
	675			680		685
Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly						
	690			695		700
Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr						
	705			710		715
Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu						
	725			730		735

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Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys  
740 745 750

Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu  
755 760 765

Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys  
770 775 780

Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys  
785 790 795 800

Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile  
805 810 815

Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser  
820 825 830

Lys Val Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile  
835 840 845

Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser  
850 855 860

<210> 103

<211> 2598

<212> DNA

<213> Clostridium botulinum

<400> 103

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gatccagatt atctgaatac caacgataag aagaacatat tccttcagac tatgattaaa      300
ctcttcaacc gtatcaaaag caaacgcgtc ggtgaaaaac tcctcgaaat gattatcaac      360
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&lt;211&gt; 866

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

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&lt;400&gt; 104

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Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe  
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Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
 85 90 95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
 100 105 110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
 115 120 125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
 130 135 140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
 145 150 155 160

Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
 290 295 300

Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
 305 310 315 320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
 325 330 335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
 340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
 355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
 370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
 385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
 405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
 420 425 430

Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Ser Ala Ile Glu Gly  
 435 440 445

Arg Ala Pro Gly Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe  
 450 455 460

Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg  
 465 470 475 480

Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile  
 485 490 495

Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro  
 500 505 510

Arg Glu Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val  
 515 520 525

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Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr  
 530 535 540

Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp  
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Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys  
 565 570 575

Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val  
 580 585 590

Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp  
 595 600 605

Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp  
 610 615 620

Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn  
 625 630 635 640

Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala  
 645 650 655

Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly  
 660 665 670

Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys  
 675 680 685

Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met  
 690 695 700

Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe  
 705 710 715 720

Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln  
 725 730 735

Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys  
 740 745 750

Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu  
 755 760 765

Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn  
 770 775 780

Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val

785

790

795

800

Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn  
 805 810 815

Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu  
 820 825 830

Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu  
 835 840 845

Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr  
 850 855 860

Asn Ser  
 865

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 <211> 2628  
 <212> DNA  
 <213> Clostridium botulinum

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 ggtttcaccg aaaccaacat cgccgagaac tacaagatca agacaagggc aagttacttc 1140

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 tacgaaaaaa gtaaagtga caaatacctg aagaccatca tgccgttcga cctgagtatc 2580  
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&lt;210&gt; 106

&lt;211&gt; 876

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 106

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Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe  
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Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
 85 90 95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
 100 105 110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
 115 120 125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
 130 135 140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
 145 150 155 160

Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
 165 170 175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
 180 185 190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
 195 200 205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
 210 215 220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
 225 230 235 240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
 245 250 255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
 260 265 270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
 275 280 285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
 290 295 300

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Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
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Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
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Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp  
 340 345 350

Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala  
 355 360 365

Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu  
 370 375 380

Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile  
 385 390 395 400

Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg  
 405 410 415

Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys  
 420 425 430

Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Glu Glu Lys  
 435 440 445

Leu Tyr Asp Asp Asp Asp Lys Asp Arg Trp Gly Ser Ser Arg Ile Cys  
 450 455 460

Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser  
 465 470 475 480

Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln  
 485 490 495

Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp  
 500 505 510

Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser  
 515 520 525

Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala  
 530 535 540

Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr  
 545 550 555 560

Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser

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565					570					575					
Phe	Asp	Asp	Ala	Leu	Leu	Phe	Ser	Asn	Lys	Val	Tyr	Ser	Phe	Phe	Ser
			580					585					590		
Met	Asp	Tyr	Ile	Lys	Thr	Ala	Asn	Lys	Val	Val	Glu	Ala	Gly	Leu	Phe
		595					600					605			
Ala	Gly	Trp	Val	Lys	Gln	Ile	Val	Asn	Asp	Phe	Val	Ile	Glu	Ala	Asn
	610					615					620				
Lys	Ser	Asn	Thr	Met	Asp	Lys	Ile	Ala	Asp	Ile	Ser	Leu	Ile	Val	Pro
625					630					635					640
Tyr	Ile	Gly	Leu	Ala	Leu	Asn	Val	Gly	Asn	Glu	Thr	Ala	Lys	Gly	Asn
				645					650					655	
Phe	Glu	Asn	Ala	Phe	Glu	Ile	Ala	Gly	Ala	Ser	Ile	Leu	Leu	Glu	Phe
			660					665						670	
Ile	Pro	Glu	Leu	Leu	Ile	Pro	Val	Val	Gly	Ala	Phe	Leu	Leu	Glu	Ser
		675					680					685			
Tyr	Ile	Asp	Asn	Lys	Asn	Lys	Ile	Ile	Lys	Thr	Ile	Asp	Asn	Ala	Leu
	690					695					700				
Thr	Lys	Arg	Asn	Glu	Lys	Trp	Ser	Asp	Met	Tyr	Gly	Leu	Ile	Val	Ala
705					710					715					720
Gln	Trp	Leu	Ser	Thr	Val	Asn	Thr	Gln	Phe	Tyr	Thr	Ile	Lys	Glu	Gly
				725					730					735	
Met	Tyr	Lys	Ala	Leu	Asn	Tyr	Gln	Ala	Gln	Ala	Leu	Glu	Glu	Ile	Ile
			740					745					750		
Lys	Tyr	Arg	Tyr	Asn	Ile	Tyr	Ser	Glu	Lys	Glu	Lys	Ser	Asn	Ile	Asn
		755					760					765			
Ile	Asp	Phe	Asn	Asp	Ile	Asn	Ser	Lys	Leu	Asn	Glu	Gly	Ile	Asn	Gln
	770					775					780				
Ala	Ile	Asp	Asn	Ile	Asn	Asn	Phe	Ile	Asn	Gly	Cys	Ser	Val	Ser	Tyr
785					790					795					800
Leu	Met	Lys	Lys	Met	Ile	Pro	Leu	Ala	Val	Glu	Lys	Leu	Leu	Asp	Phe
				805					810					815	
Asp	Asn	Thr	Leu	Lys	Lys	Asn	Leu	Leu	Asn	Tyr	Ile	Asp	Glu	Asn	Lys
			820					825					830		

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Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys  
 835 840 845

Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp  
 850 855 860

Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser  
 865 870 875

<210> 107  
 <211> 2628  
 <212> DNA  
 <213> Clostridium botulinum

<400> 107  
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 aaggctttta agatcaccga ccgtatctgg atcatcccg aacgttacac cttcggttac 180  
 aaacctgagg acttcaacaa gagtagcggg attttcaatc gtgacgtctg cgagtactat 240  
 gatccagatt atctgaatac caacgataag aagaacatat tccttcagac tatgatcaaa 300  
 ctcttcaacc gtatcaaaag caaacgctc ggtgaaaaac tcctcgaaat gattatcaac 360  
 ggtatcccg acctcgggtga ccgtcgtgtc ccgtcgaag agttcaacac caacatcgca 420  
 agcgtcaccg tcaacaaact catcagcaac ccagggtgaag tcgaacgtaa aaaagggtatc 480  
 ttcgcaaacc tcatcatctt cgggtccgggt ccggtcctca acgaaaacga aaccatcgac 540  
 atcggtatcc agaaccactt cgcaagccgt gaaggtttcg gtggtatcat gcagatgaaa 600  
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 gtcctccacg gtctctacgg tatcaaagtt gacgacctcc cgatcgtccc gaacgagaag 780  
 aaattcttca tgcagagcac cgacgcaatc cagggtgagg aactctacac cttcgggtggc 840  
 caagacccaa gtatcataac cccgtccacc gacaaaagca tctacgacaa agtcctccag 900  
 aacttcaggg gtatcgtgga cagactcaac aaagtccctg tctgcatcag cgacccgaac 960  
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 gaaaacgact tcccgatcaa cgaactgac ctggacaccg acctgataag taaaatcgaa 1560  
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 aaagttgttg aagcagggct gttcgtggt tgggttaaac agatcgtaa cgacttcggt 1860  
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 tacgaaaaaa gtaaagtga caaatacctg aagaccatca tgccgttcga cctgagtatc 2580  
 tacaccaacg acaccatcct gatcgaaatg ttcaacaaat acaacagc 2628

&lt;210&gt; 108

&lt;211&gt; 876

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 108

Ile Ser Glu Phe Gly Ser Met Pro Val Thr Ile Asn Asn Phe Asn Tyr  
 1 5 10 15

Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe  
 20 25 30

Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg  
 35 40 45

Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp  
 50 55 60

Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr  
 65 70 75 80

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Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln  
                             85                            90                            95

Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu  
                             100                            105                            110

Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg  
                             115                            120                            125

Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val  
                             130                            135                            140

Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile  
                             145                            150                            155                            160

Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn  
                             165                            170                            175

Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly  
                             180                            185                            190

Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val  
                             195                            200                            205

Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg  
                             210                            215                            220

Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His  
                             225                            230                            235                            240

Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val  
                             245                            250                            255

Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala  
                             260                            265                            270

Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro  
                             275                            280                            285

Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly  
                             290                            295                            300

Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn  
                             305                            310                            315                            320

Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe  
                             325                            330                            335

Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp

340	345	350
Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala 355 360 365		
Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu 370 375 380		
Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile 385 390 395 400		
Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg 405 410 415		
Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys 420 425 430		
Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Glu Glu Lys 435 440 445		
Leu Tyr Asp Asp Asp Asp Lys Asp Arg Trp Gly Ser Ser Arg Ile Cys 450 455 460		
Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser 465 470 475 480		
Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln 485 490 495		
Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp 500 505 510		
Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser 515 520 525		
Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala 530 535 540		
Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr 545 550 555 560		
Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser 565 570 575		
Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser 580 585 590		
Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe 595 600 605		

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Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn  
610 615 620

Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro  
625 630 635 640

Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn  
645 650 655

Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe  
660 665 670

Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser  
675 680 685

Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu  
690 695 700

Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala  
705 710 715 720

Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly  
725 730 735

Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile  
740 745 750

Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn  
755 760 765

Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln  
770 775 780

Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr  
785 790 795 800

Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe  
805 810 815

Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys  
820 825 830

Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys  
835 840 845

Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp  
850 855 860

Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser  
865 870 875



&lt;210&gt; 109

&lt;211&gt; 4260

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 109

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ccggataaac tggaagagaa attcccacag gttgcggcaa ctggcgatgg ccctgacatt 180  
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atcaaaaacca	tcgacaacgc	tctgaccaa	cgtaacgaaa	aatggagtga	tatgtacggt	3780

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 agtgtttagct acctgatgaa gaagatgatc ccgctggctg ttgaaaaact gctggacttc 4080  
 gacaacaccc tgaaaaagaa cctgctgaac tacatcgacg aaaacaagct gtacctgatc 4140  
 ggtagtgctg aatacgaaaa aagtaaagtg aacaaatacc tgaagacat catgccgttc 4200  
 gacctgagta tctacaccaa cgacaccatc ctgatcgaaa tgttcaacaa atacaacagc 4260

&lt;210&gt; 110

&lt;211&gt; 1420

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 110

Met Lys Thr Glu Glu Gly Lys Leu Val Ile Trp Ile Asn Gly Asp Lys  
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Gly Tyr Asn Gly Leu Ala Glu Val Gly Lys Lys Phe Glu Lys Asp Thr  
 20 25 30

Gly Ile Lys Val Thr Val Glu His Pro Asp Lys Leu Glu Glu Lys Phe  
 35 40 45

Pro Gln Val Ala Ala Thr Gly Asp Gly Pro Asp Ile Ile Phe Trp Ala  
 50 55 60

His Asp Arg Phe Gly Gly Tyr Ala Gln Ser Gly Leu Leu Ala Glu Ile  
 65 70 75 80

Thr Pro Asp Lys Ala Phe Gln Asp Lys Leu Tyr Pro Phe Thr Trp Asp  
 85 90 95

Ala Val Arg Tyr Asn Gly Lys Leu Ile Ala Tyr Pro Ile Ala Val Glu  
 100 105 110

Ala Leu Ser Leu Ile Tyr Asn Lys Asp Leu Leu Pro Asn Pro Pro Lys  
 115 120 125

Thr Trp Glu Glu Ile Pro Ala Leu Asp Lys Glu Leu Lys Ala Lys Gly  
 130 135 140

Lys Ser Ala Leu Met Phe Asn Leu Gln Glu Pro Tyr Phe Thr Trp Pro  
 145 150 155 160

Leu Ile Ala Ala Asp Gly Gly Tyr Ala Phe Lys Tyr Glu Asn Gly Lys  
 165 170 175

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Tyr Asp Ile Lys Asp Val Gly Val Asp Asn Ala Gly Ala Lys Ala Gly  
 180 185 190

Leu Thr Phe Leu Val Asp Leu Ile Lys Asn Lys His Met Asn Ala Asp  
 195 200 205

Thr Asp Tyr Ser Ile Ala Glu Ala Ala Phe Asn Lys Gly Glu Thr Ala  
 210 215 220

Met Thr Ile Asn Gly Pro Trp Ala Trp Ser Asn Ile Asp Thr Ser Lys  
 225 230 235 240

Val Asn Tyr Gly Val Thr Val Leu Pro Thr Phe Lys Gly Gln Pro Ser  
 245 250 255

Lys Pro Phe Val Gly Val Leu Ser Ala Gly Ile Asn Ala Ala Ser Pro  
 260 265 270

Asn Lys Glu Leu Ala Lys Glu Phe Leu Glu Asn Tyr Leu Leu Thr Asp  
 275 280 285

Glu Gly Leu Glu Ala Val Asn Lys Asp Lys Pro Leu Gly Ala Val Ala  
 290 295 300

Leu Lys Ser Tyr Glu Glu Glu Leu Ala Lys Asp Pro Arg Ile Ala Ala  
 305 310 315 320

Thr Met Glu Asn Ala Gln Lys Gly Glu Ile Met Pro Asn Ile Pro Gln  
 325 330 335

Met Ser Ala Phe Trp Tyr Ala Val Arg Thr Ala Val Ile Asn Ala Ala  
 340 345 350

Ser Gly Arg Gln Thr Val Asp Glu Ala Leu Lys Asp Ala Gln Thr Asn  
 355 360 365

Ser Ser Ser Asn Asn Asn Asn Asn Asn Asn Asn Asn Asn Leu Gly Ile  
 370 375 380

Glu Gly Arg Ile Ser Glu Phe Arg Glu Ser Gly Ala Ile Ser Gly Asp  
 385 390 395 400

Ser Leu Ile Ser Leu Ala Ser Thr Gly Lys Arg Val Ser Ile Lys Asp  
 405 410 415

Leu Leu Asp Glu Lys Asp Phe Glu Ile Trp Ala Ile Asn Glu Gln Thr  
 420 425 430

Met Lys Leu Glu Ser Ala Lys Val Ser Arg Val Phe Cys Thr Gly Lys

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435	440	445
Lys Leu Val Tyr Ile Leu Lys Thr Arg Leu Gly Arg Thr Ile Lys Ala 450 455 460		
Thr Ala Asn His Arg Phe Leu Thr Ile Asp Gly Trp Lys Arg Leu Asp 465 470 475 480		
Glu Leu Ser Leu Lys Glu His Ile Ala Leu Pro Arg Lys Leu Glu Ser 485 490 495		
Ser Ser Leu Gln Leu Ser Pro Glu Ile Glu Lys Leu Ser Gln Ser Asp 500 505 510		
Ile Tyr Trp Asp Ser Ile Val Ser Ile Thr Glu Thr Gly Val Glu Glu 515 520 525		
Val Phe Asp Leu Thr Val Pro Gly Pro His Asn Phe Val Ala Asn Asp 530 535 540		
Ile Ile Val His Asn Gly Arg Ala Met Gly Gly Arg Glu Phe Gly Ser 545 550 555 560		
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn 565 570 575		
Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg 580 585 590		
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu 595 600 605		
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly 610 615 620		
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn 625 630 635 640		
Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe 645 650 655		
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile 660 665 670		
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu 675 680 685		
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn 690 695 700		

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Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
705 710 715 720

Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
725 730 735

Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
740 745 750

Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
755 760 765

Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
770 775 780

Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
785 790 795 800

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
805 810 815

Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
820 825 830

Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
835 840 845

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
850 855 860

Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
865 870 875 880

Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
885 890 895

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
900 905 910

Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
915 920 925

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
930 935 940

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
945 950 955 960

Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
965 970 975

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr  
                   980                                  985                                  990

Lys Ile Gln Met Cys Ser Ala Ile Glu Gly Arg Ala Pro Gly Ile Cys  
           995                                  1000                                  1005

Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn  
       1010                                  1015                                  1020

Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn  
       1025                                  1030                                  1035

Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu  
       1040                                  1045                                  1050

Ile Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Arg Glu  
       1055                                  1060                                  1065

Asn Thr Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr  
       1070                                  1075                                  1080

Glu Lys Gln Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr  
       1085                                  1090                                  1095

Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg  
       1100                                  1105                                  1110

Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser  
       1115                                  1120                                  1125

Asn Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile Lys Thr Ala  
       1130                                  1135                                  1140

Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val Lys Gln  
       1145                                  1150                                  1155

Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr Met  
       1160                                  1165                                  1170

Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu  
       1175                                  1180                                  1185

Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn  
       1190                                  1195                                  1200

Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro  
       1205                                  1210                                  1215

Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr

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1220	1225	1230
Ile Asp Asn Lys Asn Lys	Ile Ile Lys Thr	Ile Asp Asn Ala Leu
1235	1240	1245
Thr Lys Arg Asn Glu Lys	Trp Ser Asp Met Tyr	Gly Leu Ile Val
1250	1255	1260
Ala Gln Trp Leu Ser Thr	Val Asn Thr Gln Phe	Tyr Thr Ile Lys
1265	1270	1275
Glu Gly Met Tyr Lys Ala	Leu Asn Tyr Gln Ala	Gln Ala Leu Glu
1280	1285	1290
Glu Ile Ile Lys Tyr Arg	Tyr Asn Ile Tyr Ser	Glu Lys Glu Lys
1295	1300	1305
Ser Asn Ile Asn Ile Asp	Phe Asn Asp Ile Asn	Ser Lys Leu Asn
1310	1315	1320
Glu Gly Ile Asn Gln Ala	Ile Asp Asn Ile Asn	Asn Phe Ile Asn
1325	1330	1335
Gly Cys Ser Val Ser Tyr	Leu Met Lys Lys Met	Ile Pro Leu Ala
1340	1345	1350
Val Glu Lys Leu Leu Asp	Phe Asp Asn Thr Leu	Lys Lys Asn Leu
1355	1360	1365
Leu Asn Tyr Ile Asp Glu	Asn Lys Leu Tyr Leu	Ile Gly Ser Ala
1370	1375	1380
Glu Tyr Glu Lys Ser Lys	Val Asn Lys Tyr Leu	Lys Thr Ile Met
1385	1390	1395
Pro Phe Asp Leu Ser Ile	Tyr Thr Asn Asp Thr	Ile Leu Ile Glu
1400	1405	1410
Met Phe Asn Lys Tyr Asn	Ser	
1415	1420	

&lt;210&gt; 111

&lt;211&gt; 2664

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 111

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tacaacgacc cgatcgacaa caacaacatc atcatgatgg aaccgccggt cgcacgtggt 120

accggacggt actacaaggc ttttaagatc accgaccgta tctggatcat cccggaacgt 180



tacaccttcg gttacaaacc tgaggacttc aacaagagta gcgggatttt caatcgtgac	240
gtctgcgagt actatgatcc agattatctg aataccaacg ataagaagaa catattcctt	300
cagactatga ttaaactctt caaccgtatc aaaagcaaac cgctcgggtga aaaactcctc	360
gaaatgatta tcaacggtat cccgtacctc ggtgaccgtc gtgtcccgtc cgaagagttc	420
aacaccaaca tcgcaagcgt caccgtcaac aaactcatca gcaaccagg tgaagtcgaa	480
cgtaaaaaag gtatcttcgc aaacctcatc atcttcgggtc cgggtccgggt cctcaacgaa	540
aacgaaacca tcgacatcgg tatccagaac cacttcgcaa gccgtgaagg ttctcgggtgt	600
atcatgcaga tgaaattctg cccggaatac gtcagcgtct tcaacaacgt ccaggaaaac	660
aaaggtgcaa gcatcttcaa ccgtcgtggt tacttcagcg acccggcact catcctcatg	720
catgaactca tccacgtcct ccacggtctc tacggtatca aagttgacga cctcccgatc	780
gtcccgaacg agaagaaatt cttcatgcag agcaccgacg caatccaggc tgaggaaatc	840
tacaccttcg gtggccaaga cccaagtatc ataaccccggt ccaccgacaa aagcatctac	900
gacaaagtcc tccagaactt caggggtatc gtggacagac tcaacaaagt cctcgtctgc	960
atcagcgacc cgaacatcaa tatcaacata tacaagaaca agttcaaaga caagtacaaa	1020
ttcgtcgagg acagcgaagg caaatacagc atcgacgtag aaagtttcga caagctctac	1080
aaaagcctca tgttcgggtt caccgaaacc aacatcgccg agaactacaa gatcaagaca	1140
agggcaagtt acttcagcga cagcctcccg cctgtcaaaa tcaagaacct cttagacaac	1200
gagatttaca caattgaaga gggcttcaac atcagtgaca aagacatgga gaaggaatac	1260
agaggtcaga acaaggctat caacaaacag gcatacgagg agatcagcaa agaacacctc	1320
gcagtctaca agatccagat gtgtaaactc gacgacgacg acaaagctcc cgggatctgc	1380
atcgacgttg acaacgaaga cctgttcttc atcgctgaca aaaacagctt cagtgcgac	1440
ctgagcaaaa acgaacgtat cgaatacaac acccagagca actacatcga aaacgacttc	1500
ccgatcaacg aactgatcct ggacaccgac ctgataagta aaatcgaact gcctagggaa	1560
aacaccgaaa gtctgaccga cttcaacgtt gacgttcggg ttacgaaaa acagccggct	1620
atcaagaaaa tcttcaccga cgaaaacacc atcttccagt acctgtacag ccagaccttc	1680
ccgtggaca tccgtgacat cagtctgacc agcagtttcg acgacgtctc gctgttcagc	1740
aacaaagttt acagtttctt cagcatggac tacatcaaaa ccgctaacaa agttgttgaa	1800
gcagggctgt tcgtgggttg ggttaaacag atcgtaacg acttcgttat cgaagctaac	1860
aaaagcaaca ctatggacaa aatcgctgac atcagttctga tcgttccgta catcgggtctg	1920
gctctgaacg ttggtaacga aaccgctaaa ggttaactttg aaaacgcttt cgagatcgct	1980
ggtgcaagca tctgtctgga gttcatcccg gaactgctga tcccggttgt tgggtctttc	2040
ctgctggaaa gttacatcga caacaaaaac aagatcatca aaaccatcga caacgctctg	2100
accaaacgta acgaaaaatg gagtgatatg tacgggtctga tcgttgctca gtggctgagc	2160

- 302 -

accgtcaaca cccagttcta caccatcaaa gaaggtatgt acaaagctct gaactaccag 2220  
 gctcaggctc tggaagagat catcaaatac cgttacaaca tctacagtga gaaggaaaag 2280  
 agtaacatca acatcgactt caacgacatc aacagcaaac tgaacgaagg tatcaaccag 2340  
 gctatcgaca acatcaacaa cttcatcaac ggttgcagtg ttagctacct gatgaagaag 2400  
 atgatccgcg tggctgttga aaaactgctg gacttcgaca acaccctgaa aaagaacctg 2460  
 ctgaactaca tcgacgaaaa caagctgtac ctgatcggtg gtgctgaata cgaaaaaagt 2520  
 aaagtgaaca aatacctgaa gaccatcatg ccgttcgacc tgagtatcta caccaacgac 2580  
 accatcctga tcgaaatgtt caacaaatac aacagcgaga tcttgtcgac tctagacgac 2640  
 ccagctttct tgtacaaagt ggtc 2664

<210> 112  
 <211> 888  
 <212> PRT  
 <213> Clostridium botulinum

<400> 112

Thr Ser Leu Tyr Lys Lys Ala Gly Phe Gly Ser Met Pro Val Thr Ile  
 1 5 10 15

Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asn Asn Ile Ile Met  
 20 25 30

Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe  
 35 40 45

Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly  
 50 55 60

Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp  
 65 70 75 80

Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys  
 85 90 95

Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe Asn Arg Ile Lys Ser  
 100 105 110

Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro  
 115 120 125

Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile  
 130 135 140

Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu  
 145 150 155 160

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Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro  
 165 170 175

Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe  
 180 185 190

Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro  
 195 200 205

Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser  
 210 215 220

Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met  
 225 230 235 240

His Glu Leu Ile His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp  
 245 250 255

Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr  
 260 265 270

Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro  
 275 280 285

Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu  
 290 295 300

Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys  
 305 310 315 320

Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys  
 325 330 335

Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp  
 340 345 350

Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu Met Phe Gly Phe Thr  
 355 360 365

Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr  
 370 375 380

Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn  
 385 390 395 400

Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asp Met  
 405 410 415

Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr  
 420 425 430

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Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys  
 435 440 445

Lys Ser Asp Asp Asp Asp Lys Ala Pro Gly Ile Cys Ile Asp Val Asp  
 450 455 460

Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser Phe Ser Asp Asp  
 465 470 475 480

Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln Ser Asn Tyr Ile  
 485 490 495

Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp Thr Asp Leu Ile  
 500 505 510

Ser Lys Ile Glu Leu Pro Arg Glu Asn Thr Glu Ser Leu Thr Asp Phe  
 515 520 525

Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala Ile Lys Lys Ile  
 530 535 540

Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr Ser Gln Thr Phe  
 545 550 555 560

Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser Phe Asp Asp Ala  
 565 570 575

Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser Met Asp Tyr Ile  
 580 585 590

Lys Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe Ala Gly Trp Val  
 595 600 605

Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn Lys Ser Asn Thr  
 610 615 620

Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro Tyr Ile Gly Leu  
 625 630 635 640

Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn Phe Glu Asn Ala  
 645 650 655

Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe Ile Pro Glu Leu  
 660 665 670

Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser Tyr Ile Asp Asn  
 675 680 685

Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu Thr Lys Arg Asn

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690                                      695                                      700  
 Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala Gln Trp Leu Ser  
 705                                      710                                      715                                      720  
 Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly Met Tyr Lys Ala  
 725                                      730                                      735  
 Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile Lys Tyr Arg Tyr  
 740                                      745                                      750  
 Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn  
 755                                      760                                      765  
 Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn  
 770                                      775                                      780  
 Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys  
 785                                      790                                      795                                      800  
 Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu  
 805                                      810                                      815  
 Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile  
 820                                      825                                      830  
 Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr  
 835                                      840                                      845  
 Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile  
 850                                      855                                      860  
 Glu Met Phe Asn Lys Tyr Asn Ser Glu Ile Leu Ser Thr Leu Asp Asp  
 865                                      870                                      875                                      880  
 Pro Ala Phe Leu Tyr Lys Val Val  
 885

<210> 113  
 <211> 1375

<212> DNA

<213> Clostridium botulinum

<400> 113

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 atcaccgacc gtatctggat catcccggaa cgttacacct tcggttacaa acctgaggac 180  
 ttcaacaaga gtagcgggat tttcaatcgt gacgtctgcg agtactatga tccagattat 240  
 ctgaataacca acgataagaa gaacatatcc cttcagacta tgattaaact cttcaaccgt 300

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atcaaaagca aaccgctcgg tgaaaaactc ctcgaaatga ttatcaacgg tatcccgtac 360  
 ctcggtgacc gtcgtgtccc gctcgaagag ttcaacacca acatcgcaag cgtcaccgtc 420  
 aacaaactca tcagcaaccc aggtgaagtc gaacgtaaaa aaggtatctt cgcaaacctc 480  
 atcatcttcg gtccgggtcc ggtcctcaac gaaaacgaaa ccatcgacat cggtatccag 540  
 aaccacttcg caagccgtga aggtttcggg ggtatcatgc agatgaaatt ctgcccggaa 600  
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 ggttacttca gcgacccggc actcactctc atgcatgaac tcatccacgt cctccacggg 720  
 ctctacggta tcaaagttga cgacctcccg atcgtcccga acgagaagaa attcttcatg 780  
 cagagcaccg acgcaatcca ggctgaggaa ctctacacct tcggtggcca agacccaagt 840  
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 atcgtggaca gactcaacaa agtcctcgtc tgcattcagcg acccgaacat caatatcaac 960  
 atatacaaga acaagttcaa agacaagtac aaattcgtcg aggacagcga aggcaaatac 1020  
 agcatcgacg tagaaagttt cgacaagctc tacaaaagcc tcatgttcgg tttcaccgaa 1080  
 accaacatcg ccgagaacta caagatcaag acaagggcaa gttacttcag cgacagcctc 1140  
 ccgcctgtca aatcaagaa cctcttagac aacgagattt acacaattga agagggcttc 1200  
 aacatcagtg acaaagacat ggagaaggaa tacagaggtc agaacaaggc tatcaacaaa 1260  
 caggcatacg aggagatcag caaagaacac ctgcagctc acaagatcca gatgtgtaaa 1320  
 tctgacgacg acgacaaagc tcccgggatc tgcattcagcg ttgacaacga gatct 1375

<210> 114  
 <211> 458  
 <212> PRT  
 <213> Clostridium botulinum

<400> 114

Gly Ser Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile  
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Asp Asn Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr  
 20 25 30

Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile  
 35 40 45

Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser  
 50 55 60

Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr  
 65 70 75 80

Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys  
 85 90 95

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Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu  
 100 105 110

Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu  
 115 120 125

Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile  
 130 135 140

Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu  
 145 150 155 160

Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp  
 165 170 175

Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile  
 180 185 190

Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val  
 195 200 205

Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser  
 210 215 220

Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly  
 225 230 235 240

Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys  
 245 250 255

Lys Phe Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr  
 260 265 270

Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys  
 275 280 285

Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg  
 290 295 300

Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn  
 305 310 315 320

Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser  
 325 330 335

Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys  
 340 345 350

Ser Leu Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys

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355                      360                      365  
 Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys  
      370                      375                      380  
  
 Ile Lys Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe  
 385                      390                      395                      400  
  
 Asn Ile Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys  
                  405                      410                      415  
  
 Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala  
                  420                      425                      430  
  
 Val Tyr Lys Ile Gln Met Cys Lys Ser Asp Asp Asp Lys Ala Pro  
      435                      440                      445  
  
 Gly Ile Cys Ile Asp Val Asp Asn Glu Ile  
      450                      455

<210> 115  
 <211> 2739  
 <212> DNA  
 <213> Clostridium botulinum

<400> 115  
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 ttaaatacac tagctaata gaactgaaaa gcctttcgca ttacaggaaa tatatgggta 180  
 atacctgata gattttcaag aaatttcta ccaaatttaa ataaacctcc tcgagttaca 240  
 agccctaaaa gtggttatta tgatccta attttgagta ctgattctga caaagataca 300  
 tttttaaaag aaattataaa gttattttaa agaattaatt ctagagaaat aggagaagaa 360  
 ttaatatata gactttcgac agatataccc tttcctggga ataacaatac tccaattaat 420  
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<213> Clostridium botulinum
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 Glu Lys Ala Phe Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg  
 50 55 60  
 Phe Ser Arg Asn Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr  
 65 70 75 80  
 Ser Pro Lys Ser Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser  
 85 90 95  
 Asp Lys Asp Thr Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile  
 100 105 110  
 Asn Ser Arg Glu Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp  
 115 120 125  
 Ile Pro Phe Pro Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe  
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 Arg Glu Asn Ile Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn  
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 Gly Glu Gly Arg Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu  
 225 230 235 240  
 Ile Leu Met His Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile  
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 Ala Ile Pro Asn Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe  
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- 311 -

Tyr Ser Gln Tyr Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe  
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Gly Gly Pro Thr Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe  
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Tyr Lys Gln Lys Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser  
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Gly Glu Val Thr Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu  
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Leu Thr Gln Ile Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val  
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Gln Asn Arg Lys Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala  
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Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg  
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Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe  
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Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys  
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Thr Leu Asp Cys Arg Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe  
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Ile Gly Asp Ile Ser Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp  
 485 490 495

Ile Asn Glu Glu Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val  
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Asp Gln Val Ile Leu Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp  
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Leu Leu Tyr Pro Ser Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu

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530

535

540

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Ser Tyr Tyr Tyr Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp  
 565 570 575

Phe Thr Phe Thr Arg Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys  
 580 585 590

Val Tyr Thr Tyr Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val  
 595 600 605

Gln Gly Gly Leu Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe  
 610 615 620

Thr Thr Asn Ile Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val  
 625 630 635 640

Ser Ala Ile Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser  
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Val Arg Arg Gly Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr  
 660 665 670

Ile Leu Leu Glu Ala Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala  
 675 680 685

Phe Val Ile Tyr Ser Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr  
 690 695 700

Ile Asp Asn Cys Leu Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr  
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Glu Trp Met Met Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn  
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Asn Ile Ser Tyr Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala  
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Lys Glu Asn Ile Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp  
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Val Lys Ile Ser Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu  
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- 313 -

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Ile Asp Ser His Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys  
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Ala Lys Val Asn Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe  
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Ser Tyr Thr Asn Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe  
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Asn Leu Gln Thr Leu Asp Asp Pro Ala Phe Leu Tyr Lys Val Val Ile  
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&lt;210&gt; 117

&lt;211&gt; 2853

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 117

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&lt;213&gt; Clostridium botulinum

&lt;400&gt; 118

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Ser Pro Lys Ser Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser  
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Asp Lys Asp Thr Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile  
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Trp Val Lys Thr Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro  
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Gly Glu Gly Arg Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu  
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Tyr Ser Gln Tyr Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe  
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Gly Gly Pro Thr Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe  
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Ile Asn Glu Glu Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val  
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Ser Tyr Tyr Tyr Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp  
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Val Tyr Thr Tyr Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val  
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Gln Gly Gly Leu Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe  
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Thr Thr Asn Ile Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val  
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Val Arg Arg Gly Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr  
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 675 680 685

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Glu Trp Met Met Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn  
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Asn Ile Ser Tyr Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala  
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Ile Lys Ala Lys Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp  
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Lys Glu Asn Ile Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp

- 318 -

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aactctctgg	acgttaaaat	ctctgaagct	atgaacaaca	tcaacaaatt	catccgtgaa	2400

- 320 -

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&lt;210&gt; 120

&lt;211&gt; 914

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 120

Ile Thr Ser Leu Tyr Lys Lys Ala Gly Phe Gly Ser Leu Asp His Met  
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Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys  
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Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro  
 35 40 45

Glu Lys Ala Phe Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg  
 50 55 60

Phe Ser Arg Asn Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr  
 65 70 75 80

Ser Pro Lys Ser Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser  
 85 90 95

Asp Lys Asp Thr Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile  
 100 105 110

Asn Ser Arg Glu Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp  
 115 120 125

Ile Pro Phe Pro Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe  
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Asp Val Asp Phe Asn Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn  
 145 150 155 160

Trp Val Lys Thr Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro  
 165 170 175

Arg Glu Asn Ile Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn  
 180 185 190

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Asn Thr Phe Ala Ala Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser  
 195 200 205

Ile Ser Pro Arg Phe Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val  
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Gly Glu Gly Arg Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu  
 225 230 235 240

Ile Leu Met His Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile  
 245 250 255

Ala Ile Pro Asn Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe  
 260 265 270

Tyr Ser Gln Tyr Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe  
 275 280 285

Gly Gly Pro Thr Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe  
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Glu Glu Lys Ala Leu Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn  
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Ser Ile Thr Thr Ala Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu  
 325 330 335

Tyr Lys Gln Lys Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser  
 340 345 350

Gly Glu Val Thr Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu  
 355 360 365

Leu Thr Gln Ile Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val  
 370 375 380

Gln Asn Arg Lys Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala  
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Asn Ile Leu Asp Asp Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile  
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Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg  
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Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe  
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Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys

- 322 -

450	455	460
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Ile Asn Glu Glu Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val 500 505 510		
Asp Gln Val Ile Leu Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp 515 520 525		
Leu Leu Tyr Pro Ser Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu 530 535 540		
Asn Gln Val Phe Tyr Asp Asn Arg Thr Gln Asn Val Asp Tyr Leu Asn 545 550 555 560		
Ser Tyr Tyr Tyr Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp 565 570 575		
Phe Thr Phe Thr Arg Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys 580 585 590		
Val Tyr Thr Tyr Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val 595 600 605		
Gln Gly Gly Leu Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe 610 615 620		
Thr Thr Asn Ile Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val 625 630 635 640		
Ser Ala Ile Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser 645 650 655		
Val Arg Arg Gly Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr 660 665 670		
Ile Leu Leu Glu Ala Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala 675 680 685		
Phe Val Ile Tyr Ser Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr 690 695 700		
Ile Asp Asn Cys Leu Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr 705 710 715 720		

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Glu Trp Met Met Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn  
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Asn Ile Ser Tyr Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala  
                   740                                  745                                  750

Ile Lys Ala Lys Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp  
                   755                                  760                                  765

Lys Glu Asn Ile Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp  
                   770                                  775                                  780

Val Lys Ile Ser Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu  
                   785                                  790                                  795                                  800

Cys Ser Val Thr Tyr Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp  
                                   805                                  810                                  815

Glu Leu Asn Glu Phe Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu  
                   820                                  825                                  830

Ile Asp Ser His Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys  
                   835                                  840                                  845

Ala Lys Val Asn Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe  
                   850                                  855                                  860

Ser Tyr Thr Asn Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe  
                   865                                  870                                  875                                  880

Asn Leu Gln Thr Leu Asp Asp Pro Ala Phe Leu Tyr Lys Val Val Ile  
                   885                                  890                                  895

Phe Gln Asn Ser Asp Pro Leu Asp Cys Glu Glu Glu Glu Glu Glu  
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Glu Cys

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<211> 2835

<212> DNA

<213> Clostridium botulinum

<400> 121

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ctgaacaccc tggctaacga accggaaaaa gctttccgta tcaccggtaa catctgggtt 180

atcccggacc gtttctctcg taactctaac ccgaacctga acaaaccgcc gcgtgttacc 240

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gaatggatga tgggtacctg gctgtctcgt atcatcacc agttcaacaa catctcttac	2220



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 <212> PRT  
 <213> Clostridium botulinum

<400> 122

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Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys  
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Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro  
 35 40 45

Glu Lys Ala Phe Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg  
 50 55 60

Phe Ser Arg Asn Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr  
 65 70 75 80

Ser Pro Lys Ser Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser  
 85 90 95

Asp Lys Asp Thr Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile  
 100 105 110

Asn Ser Arg Glu Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp  
 115 120 125

Ile Pro Phe Pro Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe  
 130 135 140

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Asp Val Asp Phe Asn Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn  
 145 150 155 160

Trp Val Lys Thr Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro  
 165 170 175

Arg Glu Asn Ile Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn  
 180 185 190

Asn Thr Phe Ala Ala Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser  
 195 200 205

Ile Ser Pro Arg Phe Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val  
 210 215 220

Gly Glu Gly Arg Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu  
 225 230 235 240

Ile Leu Met His Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile  
 245 250 255

Ala Ile Pro Asn Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe  
 260 265 270

Tyr Ser Gln Tyr Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe  
 275 280 285

Gly Gly Pro Thr Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe  
 290 295 300

Glu Glu Lys Ala Leu Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn  
 305 310 315 320

Ser Ile Thr Thr Ala Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu  
 325 330 335

Tyr Lys Gln Lys Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser  
 340 345 350

Gly Glu Val Thr Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu  
 355 360 365

Leu Thr Gln Ile Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val  
 370 375 380

Gln Asn Arg Lys Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala  
 385 390 395 400

Asn Ile Leu Asp Asp Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile  
 405 410 415

Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg  
 420 425 430

Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe  
 435 440 445

Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys  
 450 455 460

Thr Leu Asp Cys Arg Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe  
 465 470 475 480

Ile Gly Asp Ile Ser Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp  
 485 490 495

Ile Asn Glu Glu Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val  
 500 505 510

Asp Gln Val Ile Leu Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp  
 515 520 525

Leu Leu Tyr Pro Ser Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu  
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Asn Gln Val Phe Tyr Asp Asn Arg Thr Gln Asn Val Asp Tyr Leu Asn  
 545 550 555 560

Ser Tyr Tyr Tyr Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp  
 565 570 575

Phe Thr Phe Thr Arg Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys  
 580 585 590

Val Tyr Thr Tyr Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val  
 595 600 605

Gln Gly Gly Leu Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe  
 610 615 620

Thr Thr Asn Ile Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val  
 625 630 635 640

Ser Ala Ile Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser  
 645 650 655

Val Arg Arg Gly Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr  
 660 665 670

Ile Leu Leu Glu Ala Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala

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675

680

685

Phe Val Ile Tyr Ser Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr  
 690 695 700

Ile Asp Asn Cys Leu Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr  
 705 710 715 720

Glu Trp Met Met Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn  
 725 730 735

Asn Ile Ser Tyr Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala  
 740 745 750

Ile Lys Ala Lys Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp  
 755 760 765

Lys Glu Asn Ile Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp  
 770 775 780

Val Lys Ile Ser Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu  
 785 790 795 800

Cys Ser Val Thr Tyr Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp  
 805 810 815

Glu Leu Asn Glu Phe Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu  
 820 825 830

Ile Asp Ser His Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys  
 835 840 845

Ala Lys Val Asn Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe  
 850 855 860

Ser Tyr Thr Asn Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe  
 865 870 875 880

Asn Leu Gln Thr Leu Asp Asp Pro Ala Phe Leu Tyr Lys Val Val Ile  
 885 890 895

Phe Gln Asn Ser Asp Pro Leu Asp Leu Thr Asp Thr Leu Gln Ala Glu  
 900 905 910

Thr Asp Gln Leu Glu Asp Glu Lys Ser Ala Leu Gln Thr Glu Ile Ala  
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Asn Leu Leu Lys Glu Lys Glu Lys Leu Glu Phe Ile Leu Ala Ala His  
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- 330 -

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&lt;210&gt; 124

&lt;211&gt; 881

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 124

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Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys  
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Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro  
 35 40 45

Glu Lys Ala Phe Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg  
 50 55 60

Phe Ser Arg Asn Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr  
 65 70 75 80

Ser Pro Lys Ser Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser  
 85 90 95

Asp Lys Asp Thr Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile  
 100 105 110

- 331 -

Asn Ser Arg Glu Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp  
 115 120 125

Ile Pro Phe Pro Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe  
 130 135 140

Asp Val Asp Phe Asn Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn  
 145 150 155 160

Trp Val Lys Thr Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro  
 165 170 175

Arg Glu Asn Ile Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn  
 180 185 190

Asn Thr Phe Ala Ala Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser  
 195 200 205

Ile Ser Pro Arg Phe Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val  
 210 215 220

Gly Glu Gly Arg Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu  
 225 230 235 240

Ile Leu Met His Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile  
 245 250 255

Ala Ile Pro Asn Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe  
 260 265 270

Tyr Ser Gln Tyr Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe  
 275 280 285

Gly Gly Pro Thr Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe  
 290 295 300

Glu Glu Lys Ala Leu Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn  
 305 310 315 320

Ser Ile Thr Thr Ala Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu  
 325 330 335

Tyr Lys Gln Lys Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser  
 340 345 350

Gly Glu Val Thr Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu  
 355 360 365

Leu Thr Gln Ile Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val  
 370 375 380

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Gln Asn Arg Lys Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala  
 385 390 395 400

Asn Ile Leu Asp Asp Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile  
 405 410 415

Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg  
 420 425 430

Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe  
 435 440 445

Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys  
 450 455 460

Thr Leu Asp Cys Arg Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe  
 465 470 475 480

Ile Gly Asp Ile Ser Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp  
 485 490 495

Ile Asn Glu Glu Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val  
 500 505 510

Asp Gln Val Ile Leu Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp  
 515 520 525

Leu Leu Tyr Pro Ser Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu  
 530 535 540

Asn Gln Val Phe Tyr Asp Asn Arg Thr Gln Asn Val Asp Tyr Leu Asn  
 545 550 555 560

Ser Tyr Tyr Tyr Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp  
 565 570 575

Phe Thr Phe Thr Arg Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys  
 580 585 590

Val Tyr Thr Tyr Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val  
 595 600 605

Gln Gly Gly Leu Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe  
 610 615 620

Thr Thr Asn Ile Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val  
 625 630 635 640

Ser Ala Ile Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser



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645	650	655
Val Arg Arg Gly Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr 660 665 670		
Ile Leu Leu Glu Ala Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala 675 680 685		
Phe Val Ile Tyr Ser Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr 690 695 700		
Ile Asp Asn Cys Leu Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr 705 710 715 720		
Glu Trp Met Met Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn 725 730 735		
Asn Ile Ser Tyr Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala 740 745 750		
Ile Lys Ala Lys Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp 755 760 765		
Lys Glu Asn Ile Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp 770 775 780		
Val Lys Ile Ser Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu 785 790 795 800		
Cys Ser Val Thr Tyr Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp 805 810 815		
Glu Leu Asn Glu Phe Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu 820 825 830		
Ile Asp Ser His Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys 835 840 845		
Ala Lys Val Asn Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe 850 855 860		
Ser Tyr Thr Asn Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe 865 870 875 880		
Asn		

<210> 125  
 <211> 2631  
 <212> DNA

## &lt;213&gt; Clostridium botulinum

&lt;400&gt; 125

gtaccggaat	tcggatcctc	tagagtcgac	catatgccaa	taacaattaa	caactttaat	60
tattcagatc	ctggttgataa	taaaaatatt	ttatatattag	atactcattt	aaatacacta	120
gctaattgagc	ctgaaaaagc	ctttcgcatt	acaggaaata	tatgggtaat	acctgataga	180
ttttcaagaa	attctaattc	aaattttaaat	aaacctcctc	gagttacaag	ccctaaaagt	240
ggttattatg	atcctaatta	tttgagtact	gattctgaca	aagatacatt	tttaaaagaa	300
attataaagt	tattttaaag	aattaattct	agagaaatag	gagaagaatt	aatatataga	360
ctttcgacag	atataccctt	tcttggggaat	aacaatactc	caattaatac	ctttgatattt	420
gatgtagatt	ttaacagtgt	tgatgttaaa	actagacaag	gtaacaactg	ggttaaaact	480
ggtagcataa	atcctagtgt	tataataact	ggacctagag	aaaacattat	agatccagaa	540
acttctacgt	ttaaattaac	taacaatacc	tttgccgcac	aagaaggatt	tggtgcttta	600
tcaataattt	caatatcacc	tagatttatg	ctaacaata	gtaatgcaac	taatgatgta	660
ggagagggta	gattttctaa	gtctgaattt	tgcatggatc	caatactaata	tttaatgcat	720
gaacttaatc	atgcaatgca	taatttatat	ggaatagcta	taccaaatga	tcaaacaatt	780
tcatctgtaa	ctagtaatat	tttttattct	caatataatg	tgaaattaga	gtatgcagaa	840
atatatgcat	ttggagggtcc	aactatagac	cttattccta	aaagtgcaag	gaaatatttt	900
gaggaaaagg	cattggatta	ttatagatct	atagctaaaa	gacttaatag	tataactact	960
gcaaatcctt	caagctttaa	taaatatata	ggggaatata	aacagaaact	tattagaaag	1020
tatagattcg	tagtagaatc	ttcagggtgaa	gttacagtaa	atcgtaataa	gtttgttgag	1080
ttatataatg	aacttacaca	aatattttaca	gaatttaact	acgctaaaat	atataatgta	1140
caaaatagga	aaatatatct	ttcaaagtga	tatactccgg	ttacggcgaa	tatattagac	1200
gataatgttt	atgatataca	aaatggattt	aatataccta	aaagtaattt	aatgtacta	1260
tttatgggtc	aaaattttatc	tcgaaatcca	gcattaagaa	aagtcaatcc	tgaaaatatg	1320
ctttattttat	ttacaaaatt	ttgtcataaa	gcaatagatg	gtagatcatt	atataataaa	1380
acattagatt	gtagagagct	tttagttaaa	aatactgact	taccctttat	aggtgatatt	1440
agtgatgtta	aaactgatat	attttttaaga	aaagatatta	atgaagaaac	tgaagttata	1500
tactatccgg	acaatgtttc	agtagatcaa	gttattctca	gtaagaatac	ctcagaacat	1560
ggacaactag	attttattata	ccctagtatt	gacagtgaga	gtgaaatatt	accagggggag	1620
aatcaagtct	tttatgataa	tagaactcaa	aatgttgatt	atttgaattc	ttattattac	1680
ctagaatctc	aaaaactaag	tgataatgtt	gaagatttta	cttttacgag	atcaattgag	1740
gaggcttttg	ataatagtgc	aaaagtatat	acttactttc	ctacactagc	taataaagta	1800
aatgcgggtg	ttcaagggtg	tttatttttta	atgtgggcaa	atgatgtagt	tgaagatttt	1860
actacaaata	ttctaagaaa	agatacatta	gataaaatat	cagatgtatc	agctattatt	1920

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ccctatatag gacccgcatt aaatataagt aattctgtaa gaagaggaaa ttttactgaa 1980  
gcatttgcag ttactggtgt aactatttta ttagaagcat ttcctgaatt tacaatacct 2040  
gcacttggtg catttgtgat ttatagtaag gttcaagaaa gaaacgagat tattaaaact 2100  
atagataatt gtttagaaca aaggattaag agatggaaag attcatatga atggatgatg 2160  
ggaacgtggt tatccaggat tattactcaa ttttaataata taagttatca aatgtatgat 2220  
tcttttaatt atcaggcagg tgcaatcaaa gctaaaatag atttagaata taaaaaatat 2280  
tcaggaagtg ataaagaaaa tataaaaagt caagttgaaa atttaaaaaa tagtttagat 2340  
gtaaaaattt cggaagcaat gaataatata aataaattta tacgagaatg ttccgtaaca 2400  
tattttattta aaaatatggt acctaaagta attgatgaat taaatgagtt tgatcgaaat 2460  
actaaagcaa aattaattaa tcttatagat agtcataata ttattctagt tggatgaagta 2520  
gataaattaa aagcaaaaagt aaataatagc tttcaaaaata caataccctt taatattttt 2580  
tcatatacta ataattcttt attaaaagat ataattaatg aatatttcaa t 2631

&lt;210&gt; 126

&lt;211&gt; 877

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 126

Val Pro Glu Phe Gly Ser Ser Arg Val Asp His Met Pro Ile Thr Ile  
1 5 10 15

Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr  
20 25 30

Leu Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro Glu Lys Ala Phe  
35 40 45

Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg Phe Ser Arg Asn  
50 55 60

Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr Ser Pro Lys Ser  
65 70 75 80

Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser Asp Lys Asp Thr  
85 90 95

Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile Asn Ser Arg Glu  
100 105 110

Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp Ile Pro Phe Pro  
115 120 125

Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe Asp Val Asp Phe  
130 135 140

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Asn Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn Trp Val Lys Thr  
145 150 155 160

Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro Arg Glu Asn Ile  
165 170 175

Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn Asn Thr Phe Ala  
180 185 190

Ala Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser Ile Ser Pro Arg  
195 200 205

Phe Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val Gly Glu Gly Arg  
210 215 220

Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu Ile Leu Met His  
225 230 235 240

Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile Ala Ile Pro Asn  
245 250 255

Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe Tyr Ser Gln Tyr  
260 265 270

Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe Gly Gly Pro Thr  
275 280 285

Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe Glu Glu Lys Ala  
290 295 300

Leu Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn Ser Ile Thr Thr  
305 310 315 320

Ala Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu Tyr Lys Gln Lys  
325 330 335

Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser Gly Glu Val Thr  
340 345 350

Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu Leu Thr Gln Ile  
355 360 365

Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val Gln Asn Arg Lys  
370 375 380

Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala Asn Ile Leu Asp  
385 390 395 400

Asp Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile Pro Lys Ser Asn

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405	410	415
Leu Asn Val 420	Leu Phe Met Gly Gln Asn Leu Ser Arg Asn Pro Ala Leu 425	
Arg Lys Val 435	Asn Pro Glu Asn Met Leu Tyr Leu Phe Thr Lys Phe Cys 440	
His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys Thr Leu Asp Cys 450		445
Arg Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe Ile Gly Asp Ile 465		460
Ser Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp Ile Asn Glu Glu 485		475
Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val Asp Gln Val Ile 500		490
Leu Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp Leu Leu Tyr Pro 515		510
Ser Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu Asn Gln Val Phe 530		525
Tyr Asp Asn Arg Thr Gln Asn Val Asp Tyr Leu Asn Ser Tyr Tyr Tyr 545		540
Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp Phe Thr Phe Thr 565		555
Arg Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys Val Tyr Thr Tyr 580		570
Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val Gln Gly Gly Leu 595		590
Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe Thr Thr Asn Ile 610		605
Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val Ser Ala Ile Ile 625		620
Pro Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser Val Arg Arg Gly 645		630
Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr Ile Leu Leu Glu 660		635
		640
		650
		655
		660
		665
		670

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Ala Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala Phe Val Ile Tyr  
675 680 685

Ser Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr Ile Asp Asn Cys  
690 695 700

Leu Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr Glu Trp Met Met  
705 710 715 720

Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn Asn Ile Ser Tyr  
725 730 735

Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala Ile Lys Ala Lys  
740 745 750

Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp Lys Glu Asn Ile  
755 760 765

Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp Val Lys Ile Ser  
770 775 780

Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu Cys Ser Val Thr  
785 790 795 800

Tyr Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp Glu Leu Asn Glu  
805 810 815

Phe Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu Ile Asp Ser His  
820 825 830

Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys Ala Lys Val Asn  
835 840 845

Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe Ser Tyr Thr Asn  
850 855 860

Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe Asn  
865 870 875

<210> 127

<211> 2628

<212> DNA

<213> Clostridium botulinum

<400> 127

gtagaattcg gatcctctag agtcgaccat atgccataa caattaacaa ctttaattat 60

tcagatcctg ttgataataa aaatatattta tatttagata ctcatttaaa tacactagct 120

aatgagcctg aaaaagcctt tcgcattaca ggaaatatat gggtaatacc tgatagattt 180

tcaagaaatt ctaatccaaa tttaaataaa ctcctcgcag ttacaagccc taaaagtggt 240

tattatgatc ctaattat	tggactgat tctgacaa	ag atacat	ttttt aaaagaa	att 300		
ataaagt	tatat ttaaaaga	at taattct	aga gaaatagg	ag aagaatta	at atatag	actt 360
tcgacagata	taccctttcc	tgggaataac	aatactccaa	ttaatac	ctt tgatttt	gat 420
gtagatttta	acagtgttga	tgttaaaa	act agacaagg	ta acaactgg	gt taaaactg	gtt 480
agcataaatc	ctagtgttat	aataactgga	cctagagaaa	acattataga	tccagaaa	act 540
tctacgttta	aattaactaa	caataccttt	gcggcacaag	aaggatttgg	tgctttat	tca 600
ataatttcaa	tatcacctag	atttatgcta	acatatagta	atgcaactaa	tgatgtag	ga 660
gagggtagat	tttctaagtc	tgaattttgc	atggatccaa	tactaatttt	aatgcatg	aa 720
cttaatcatg	caatgcataa	tttatatgga	atagctatac	caaatgatca	aacaattt	tca 780
tctgtaacta	gtaatat	ttttctcaa	tataatgtga	aattagagta	tcgagaaa	ata 840
tatgcatttg	gaggtccaac	tatagacctt	attcctaaaa	gtgcaagg	aa atattt	tgag 900
gaaaaggcat	tggattatta	tagatctata	gctaaaagac	ttaatagtat	aactactg	ca 960
aatccttcaa	gctttaataa	atatataggg	gaatataaac	agaaacttat	tagaaa	agtat 1020
agattcgtag	tagaatcttc	aggtgaagtt	acagtaa	atc gtaata	agtt tgttg	agtta 1080
tataatgaac	ttacacaa	at ttacagaa	tttaactacg	ctaaaatata	taatgtaca	aa 1140
aataggaaaa	tatatctttc	aaatgtatat	actccgggta	cggcgaatat	attagacg	at 1200
aatgtttatg	atatacaaaa	tggattta	at accta	aaaa gtaattt	aaa tgtact	at 1260
atgggtcaaa	atttatctcg	aaatccagca	ttaagaaaag	tcaatcctga	aaat	atgctt 1320
tatttat	ttta caaaa	tttg tcataa	agca atagat	ggta gatcatt	tata taata	aaaaca 1380
ttagattgta	gagagctttt	agttaaaa	aat actgact	tac cctttat	agg tgatatt	agt 1440
gatgttaaaa	ctgatata	tatt tttaag	aaaa gatatta	aatg aagaa	actga agttat	atac 1500
tatccggaca	atgtttcagt	agatcaagtt	attctcagta	agaatacctc	agaacatg	ga 1560
caactagatt	tattataccc	tagtattgac	agtgagagtg	aaatattacc	aggggaga	aat 1620
caagtctttt	atgataatag	aactcaaa	aat gttgatt	att tgaatt	ctta ttattac	cta 1680
gaatctcaaa	aactaagtga	taatgttgaa	gattttactt	ttacgagatc	aattgagg	gag 1740
gctttggata	atagtgcaaa	agtatata	act tactttc	cta cactag	ctaa taaag	taaat 1800
gcgggtgttc	aaggtggtt	at ttttta	atg tgggca	aatg atgtag	ttga agattt	tact 1860
acaaatattc	taagaaaaga	tacattagat	aaaatatcag	atgtatcagc	tattattccc	cc 1920
tatataggac	ccgcattaaa	tataagta	aat tctgta	agaa gaggaa	attt tactga	agca 1980
tttgagttta	ctgggtgta	ac tatttt	tatta gaagcatt	tc ctgaatt	tac aatac	ctgca 2040
cttggtgcat	ttgtgattta	tagtaagg	tt caagaa	agaa acgag	attat taaa	actata 2100
gataattg	tt tagaaca	aaag gatta	agaga tggaa	agatt catat	gaatg gatgat	ggga 2160
acgtggttat	ccaggattat	tactcaattt	aataatataa	gttatcaaat	gtatgatt	ct 2220

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ttaaattatc aggcaggtgc aatcaaagct aaaatagatt tagaatataa aaaatattca 2280  
 ggaagtgata aagaaaatat aaaaagtcaa gttgaaaatt taaaaaatag tttagatgta 2340  
 aaaatttcgg aagcaatgaa taatataaat aaattttatac gagaatgttc cgtaacatat 2400  
 ttattttaaaa atatgttacc taaagtaatt gatgaattaa atgagtttga tcgaaatact 2460  
 aaagcaaaat taattaatct tatagatagt cataatatta ttctagttgg tgaagtagat 2520  
 aaattaaaag caaaagtaaa taatagcttt caaaatacaa taccctttaa tattttttca 2580  
 tataactaata attcttttatt aaaagatata attaatgaat atttcaat 2628

&lt;210&gt; 128

&lt;211&gt; 876

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum.

&lt;400&gt; 128

Val Glu Phe Gly Ser Ser Arg Val Asp His Met Pro Ile Thr Ile Asn  
1 5 10 15

Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu  
20 25 30

Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro Glu Lys Ala Phe Arg  
35 40 45

Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg Phe Ser Arg Asn Ser  
50 55 60

Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr Ser Pro Lys Ser Gly  
65 70 75 80

Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser Asp Lys Asp Thr Phe  
85 90 95

Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile Asn Ser Arg Glu Ile  
100 105 110

Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp Ile Pro Phe Pro Gly  
115 120 125

Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe Asp Val Asp Phe Asn  
130 135 140

Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn Trp Val Lys Thr Gly  
145 150 155 160

Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro Arg Glu Asn Ile Ile  
165 170 175



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Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn Asn Thr Phe Ala Ala  
 180 185 190

Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser Ile Ser Pro Arg Phe  
 195 200 205

Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val Gly Glu Gly Arg Phe  
 210 215 220

Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu Ile Leu Met His Glu  
 225 230 235 240

Leu Asn His Ala Met His Asn Leu Tyr Gly Ile Ala Ile Pro Asn Asp  
 245 250 255

Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe Tyr Ser Gln Tyr Asn  
 260 265 270

Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe Gly Gly Pro Thr Ile  
 275 280 285

Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe Glu Glu Lys Ala Leu  
 290 295 300

Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn Ser Ile Thr Thr Ala  
 305 310 315 320

Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu Tyr Lys Gln Lys Leu  
 325 330 335

Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser Gly Glu Val Thr Val  
 340 345 350

Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu Leu Thr Gln Ile Phe  
 355 360 365

Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val Gln Asn Arg Lys Ile  
 370 375 380

Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala Asn Ile Leu Asp Asp  
 385 390 395 400

Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile Pro Lys Ser Asn Leu  
 405 410 415

Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg Asn Pro Ala Leu Arg  
 420 425 430

Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe Thr Lys Phe Cys His  
 435 440 445

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Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys Thr Leu Asp Cys Arg  
 450 455 460

Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe Ile Gly Asp Ile Ser  
 465 470 475 480

Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp Ile Asn Glu Glu Thr  
 485 490 495

Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val Asp Gln Val Ile Leu  
 500 505 510

Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp Leu Leu Tyr Pro Ser  
 515 520 525

Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu Asn Gln Val Phe Tyr  
 530 535 540

Asp Asn Arg Thr Gln Asn Val Asp Tyr Leu Asn Ser Tyr Tyr Tyr Leu  
 545 550 555 560

Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp Phe Thr Phe Thr Arg  
 565 570 575

Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys Val Tyr Thr Tyr Phe  
 580 585 590

Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val Gln Gly Gly Leu Phe  
 595 600 605

Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe Thr Thr Asn Ile Leu  
 610 615 620

Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val Ser Ala Ile Ile Pro  
 625 630 635 640

Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser Val Arg Arg Gly Asn  
 645 650 655

Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr Ile Leu Leu Glu Ala  
 660 665 670

Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala Phe Val Ile Tyr Ser  
 675 680 685

Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr Ile Asp Asn Cys Leu  
 690 695 700

Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr Glu Trp Met Met Gly

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705		710		715		720
Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn Asn Ile Ser Tyr Gln						
		725		730		735
Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala Ile Lys Ala Lys Ile						
		740		745		750
Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp Lys Glu Asn Ile Lys						
		755		760		765
Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp Val Lys Ile Ser Glu						
		770		775		780
Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu Cys Ser Val Thr Tyr						
		785		790		800
Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp Glu Leu Asn Glu Phe						
		805		810		815
Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu Ile Asp Ser His Asn						
		820		825		830
Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys Ala Lys Val Asn Asn						
		835		840		845
Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe Ser Tyr Thr Asn Asn						
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Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe Asn						
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 <212> DNA  
 <213> Clostridium botulinum

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 attataaagt tatttaaaag aattaattct agagaaatag gagaagaatt aatatataga 360  
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 gatgtagatt ttaacagtgt tgatgttaaa actagacaag gtaacaactg gggttaaaact 480  
 ggtagcataa atcctagtgt tataataact ggacctagag aaaacattat agatccagaa 540

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gataaattaa aagcaaaagt aaataatagc tttcaaaata caataaccctt taatatatttt 2580  
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 <212> PRT  
 <213> Clostridium botulinum

<400> 130

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Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr  
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Leu Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro Glu Lys Ala Phe  
 35 40 45

Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg Phe Ser Arg Asn  
 50 55 60

Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr Ser Pro Lys Ser  
 65 70 75 80

Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser Asp Lys Asp Thr  
 85 90 95

Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile Asn Ser Arg Glu  
 100 105 110

Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp Ile Pro Phe Pro  
 115 120 125

Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe Asp Val Asp Phe  
 130 135 140

Asn Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn Trp Val Lys Thr  
 145 150 155 160

Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro Arg Glu Asn Ile  
 165 170 175

Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn Asn Thr Phe Ala  
 180 185 190

Ala Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser Ile Ser Pro Arg  
 195 200 205

Phe Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val Gly Glu Gly Arg  
 210 215 220

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Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu Ile Leu Met His  
 225 230 235 240  
 Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile Ala Ile Pro Asn  
 245 250 255  
 Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe Tyr Ser Gln Tyr  
 260 265 270  
 Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe Gly Gly Pro Thr  
 275 280 285  
 Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe Glu Glu Lys Ala  
 290 295 300  
 Leu Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn Ser Ile Thr Thr  
 305 310 315 320  
 Ala Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu Tyr Lys Gln Lys  
 325 330 335  
 Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser Gly Glu Val Thr  
 340 345 350  
 Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu Leu Thr Gln Ile  
 355 360 365  
 Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val Gln Asn Arg Lys  
 370 375 380  
 Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala Asn Ile Leu Asp  
 385 390 395 400  
 Asp Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile Pro Lys Ser Asn  
 405 410 415  
 Leu Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg Asn Pro Ala Leu  
 420 425 430  
 Arg Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe Thr Lys Phe Cys  
 435 440 445  
 His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys Thr Leu Asp Cys  
 450 455 460  
 Arg Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe Ile Gly Asp Ile  
 465 470 475 480  
 Ser Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp Ile Asn Glu Glu

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485										490					495				
Thr	Glu	Val	Ile	Tyr	Tyr	Pro	Asp	Asn	Val	Ser	Val	Asp	Gln	Val	Ile				
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Ser	Ile	Asp	Ser	Glu	Ser	Glu	Ile	Leu	Pro	Gly	Glu	Asn	Gln	Val	Phe				
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Tyr	Asp	Asn	Arg	Thr	Gln	Asn	Val	Asp	Tyr	Leu	Asn	Ser	Tyr	Tyr	Tyr				
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Leu	Glu	Ser	Gln	Lys	Leu	Ser	Asp	Asn	Val	Glu	Asp	Phe	Thr	Phe	Thr				
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Arg	Ser	Ile	Glu	Glu	Ala	Leu	Asp	Asn	Ser	Ala	Lys	Val	Tyr	Thr	Tyr				
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Phe	Pro	Thr	Leu	Ala	Asn	Lys	Val	Asn	Ala	Gly	Val	Gln	Gly	Gly	Leu				
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Pro	Tyr	Ile	Gly	Pro	Ala	Leu	Asn	Ile	Ser	Asn	Ser	Val	Arg	Arg	Gly				
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Ala	Phe	Pro	Glu	Phe	Thr	Ile	Pro	Ala	Leu	Gly	Ala	Phe	Val	Ile	Tyr				
		675					680					685							
Ser	Lys	Val	Gln	Glu	Arg	Asn	Glu	Ile	Ile	Lys	Thr	Ile	Asp	Asn	Cys				
	690					695					700								
Leu	Glu	Gln	Arg	Ile	Lys	Arg	Trp	Lys	Asp	Ser	Tyr	Glu	Trp	Met	Met				
705					710					715					720				
Gly	Thr	Trp	Leu	Ser	Arg	Ile	Ile	Thr	Gln	Phe	Asn	Asn	Ile	Ser	Tyr				
				725					730					735					
Gln	Met	Tyr	Asp	Ser	Leu	Asn	Tyr	Gln	Ala	Gly	Ala	Ile	Lys	Ala	Lys				
		740						745					750						

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Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp Lys Glu Asn Ile  
755 760 765

Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp Val Lys Ile Ser  
770 775 780

Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu Cys Ser Val Thr  
785 790 795 800

Tyr Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp Glu Leu Asn Glu  
805 810 815

Phe Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu Ile Asp Ser His  
820 825 830

Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys Ala Lys Val Asn  
835 840 845

Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe Ser Tyr Thr Asn  
850 855 860

Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe Asn  
865 870 875

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<212> DNA  
<213> Clostridium botulinum

<400> 131  
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ttaaatacac tagctaata gcttgaaaaa gcctttcgca ttacaggaaa tatatgggta 180  
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tttttaaaag aaattataaa gttattttaa agaattaatt ctagagaaat aggagaagaa 360  
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acctttgatt ttgatgtaga ttttaacagt gttgatgtta aaactagaca aggtaacaac 480  
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attttaatgc atgaacttaa tcatgcaatg cataatttat atggaatagc tataccaaaat 780  
gatcaaacia tttcatctgt aactagtaat attttttatt ctcaatataa tgtgaaatta 840



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<211> 902  
 <212> PRT  
 <213> Clostridium botulinum

<400> 132

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Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn Lys  
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Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala Asn Glu Pro  
 35 40 45

Glu Lys Ala Phe Arg Ile Thr Gly Asn Ile Trp Val Ile Pro Asp Arg  
 50 55 60

Phe Ser Arg Asn Ser Asn Pro Asn Leu Asn Lys Pro Pro Arg Val Thr  
 65 70 75 80

Ser Pro Lys Ser Gly Tyr Tyr Asp Pro Asn Tyr Leu Ser Thr Asp Ser  
 85 90 95

Asp Lys Asp Thr Phe Leu Lys Glu Ile Ile Lys Leu Phe Lys Arg Ile  
 100 105 110

Asn Ser Arg Glu Ile Gly Glu Glu Leu Ile Tyr Arg Leu Ser Thr Asp  
 115 120 125

Ile Pro Phe Pro Gly Asn Asn Asn Thr Pro Ile Asn Thr Phe Asp Phe  
 130 135 140

Asp Val Asp Phe Asn Ser Val Asp Val Lys Thr Arg Gln Gly Asn Asn  
 145 150 155 160

Trp Val Lys Thr Gly Ser Ile Asn Pro Ser Val Ile Ile Thr Gly Pro  
 165 170 175

Arg Glu Asn Ile Ile Asp Pro Glu Thr Ser Thr Phe Lys Leu Thr Asn  
 180 185 190

Asn Thr Phe Ala Ala Gln Glu Gly Phe Gly Ala Leu Ser Ile Ile Ser  
 195 200 205

Ile Ser Pro Arg Phe Met Leu Thr Tyr Ser Asn Ala Thr Asn Asp Val  
 210 215 220

Gly Glu Gly Arg Phe Ser Lys Ser Glu Phe Cys Met Asp Pro Ile Leu  
 225 230 235 240

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Ile Leu Met His Glu Leu Asn His Ala Met His Asn Leu Tyr Gly Ile  
 245 250 255

Ala Ile Pro Asn Asp Gln Thr Ile Ser Ser Val Thr Ser Asn Ile Phe  
 260 265 270

Tyr Ser Gln Tyr Asn Val Lys Leu Glu Tyr Ala Glu Ile Tyr Ala Phe  
 275 280 285

Gly Gly Pro Thr Ile Asp Leu Ile Pro Lys Ser Ala Arg Lys Tyr Phe  
 290 295 300

Glu Glu Lys Ala Leu Asp Tyr Tyr Arg Ser Ile Ala Lys Arg Leu Asn  
 305 310 315 320

Ser Ile Thr Thr Ala Asn Pro Ser Ser Phe Asn Lys Tyr Ile Gly Glu  
 325 330 335

Tyr Lys Gln Lys Leu Ile Arg Lys Tyr Arg Phe Val Val Glu Ser Ser  
 340 345 350

Gly Glu Val Thr Val Asn Arg Asn Lys Phe Val Glu Leu Tyr Asn Glu  
 355 360 365

Leu Thr Gln Ile Phe Thr Glu Phe Asn Tyr Ala Lys Ile Tyr Asn Val  
 370 375 380

Gln Asn Arg Lys Ile Tyr Leu Ser Asn Val Tyr Thr Pro Val Thr Ala  
 385 390 395 400

Asn Ile Leu Asp Asp Asn Val Tyr Asp Ile Gln Asn Gly Phe Asn Ile  
 405 410 415

Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu Ser Arg  
 420 425 430

Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr Leu Phe  
 435 440 445

Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys  
 450 455 460

Thr Leu Asp Cys Arg Glu Leu Leu Val Lys Asn Thr Asp Leu Pro Phe  
 465 470 475 480

Ile Gly Asp Ile Ser Asp Val Lys Thr Asp Ile Phe Leu Arg Lys Asp  
 485 490 495

Ile Asn Glu Glu Thr Glu Val Ile Tyr Tyr Pro Asp Asn Val Ser Val  
 500 505 510

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Asp Gln Val Ile Leu Ser Lys Asn Thr Ser Glu His Gly Gln Leu Asp  
 515 520 525

Leu Leu Tyr Pro Ser Ile Asp Ser Glu Ser Glu Ile Leu Pro Gly Glu  
 530 535 540

Asn Gln Val Phe Tyr Asp Asn Arg Thr Gln Asn Val Asp Tyr Leu Asn  
 545 550 555 560

Ser Tyr Tyr Tyr Leu Glu Ser Gln Lys Leu Ser Asp Asn Val Glu Asp  
 565 570 575

Phe Thr Phe Thr Arg Ser Ile Glu Glu Ala Leu Asp Asn Ser Ala Lys  
 580 585 590

Val Tyr Thr Tyr Phe Pro Thr Leu Ala Asn Lys Val Asn Ala Gly Val  
 595 600 605

Gln Gly Gly Leu Phe Leu Met Trp Ala Asn Asp Val Val Glu Asp Phe  
 610 615 620

Thr Thr Asn Ile Leu Arg Lys Asp Thr Leu Asp Lys Ile Ser Asp Val  
 625 630 635 640

Ser Ala Ile Ile Pro Tyr Ile Gly Pro Ala Leu Asn Ile Ser Asn Ser  
 645 650 655

Val Arg Arg Gly Asn Phe Thr Glu Ala Phe Ala Val Thr Gly Val Thr  
 660 665 670

Ile Leu Leu Glu Ala Phe Pro Glu Phe Thr Ile Pro Ala Leu Gly Ala  
 675 680 685

Phe Val Ile Tyr Ser Lys Val Gln Glu Arg Asn Glu Ile Ile Lys Thr  
 690 695 700

Ile Asp Asn Cys Leu Glu Gln Arg Ile Lys Arg Trp Lys Asp Ser Tyr  
 705 710 715 720

Glu Trp Met Met Gly Thr Trp Leu Ser Arg Ile Ile Thr Gln Phe Asn  
 725 730 735

Asn Ile Ser Tyr Gln Met Tyr Asp Ser Leu Asn Tyr Gln Ala Gly Ala  
 740 745 750

Ile Lys Ala Lys Ile Asp Leu Glu Tyr Lys Lys Tyr Ser Gly Ser Asp  
 755 760 765

Lys Glu Asn Ile Lys Ser Gln Val Glu Asn Leu Lys Asn Ser Leu Asp

770	775	780
Val Lys Ile Ser Glu Ala Met Asn Asn Ile Asn Lys Phe Ile Arg Glu		
785	790	795 800
Cys Ser Val Thr Tyr Leu Phe Lys Asn Met Leu Pro Lys Val Ile Asp		
	805	810 815
Glu Leu Asn Glu Phe Asp Arg Asn Thr Lys Ala Lys Leu Ile Asn Leu		
	820	825 830
Ile Asp Ser His Asn Ile Ile Leu Val Gly Glu Val Asp Lys Leu Lys		
	835	840 845
Ala Lys Val Asn Asn Ser Phe Gln Asn Thr Ile Pro Phe Asn Ile Phe		
	850	855 860
Ser Tyr Thr Asn Asn Ser Leu Leu Lys Asp Ile Ile Asn Glu Tyr Phe		
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Asn Leu Gln Thr Leu Asp Asp Pro Ala Phe Leu Tyr Lys Val Val Ile		
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Phe Gln Asn Ser Asp Pro		
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 <212> DNA  
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ccaataacaa ttaacaactt taattattca gatcctgttg ataataaaaa tattttatat	180
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aatatatggg taatacctga tagattttca agaaattcta atccaaattt aaataaacct	300
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&lt;210&gt; 137

&lt;211&gt; 5558

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 137

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&lt;210&gt; 138

&lt;211&gt; 3393

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 138

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&lt;211&gt; 1130

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 139

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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

- 368 -

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Asp Asp  
325 330 335

Asp Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr  
340 345 350

Thr Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr  
355 360 365

Tyr Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys  
370 375 380

Val Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu  
385 390 395 400

Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe  
405 410 415

Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu  
420 425 430

Cys Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly  
435 440 445

Tyr Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp  
450 455 460

Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys  
465 470 475 480

Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn  
485 490 495

Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp  
500 505 510

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Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile  
 515 520 525

Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys  
 530 535 540

Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln  
 545 550 555 560

Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn  
 565 570 575

~~Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp~~  
 580 585 590

Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly  
 595 600 605

Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val  
 610 615 620

Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile  
 625 630 635 640

Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val  
 645 650 655

Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro  
 660 665 670

Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile  
 675 680 685

Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys  
 690 695 700

Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp  
 705 710 715 720

Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys  
 725 730 735

Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr  
 740 745 750

Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn  
 755 760 765

Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met

- 370 -

770	775	780
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Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala 805 810 815		
Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr 820 825 830		
Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu 835 840 845		
Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg 850 855 860		
Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ile Leu Ser Ser Gly Asp 865 870 875 880		
Val Tyr Ser Gly Gly Ser Pro Gly Ala Val Glu Thr Ile Ser Phe Ser 885 890 895		
Phe Ser Glu Phe Glu Pro Gly Asn Asn Asp Leu Thr Leu Gln Gly Ala 900 905 910		
Ala Ile Ile Thr Gln Ser Gly Val Leu Gln Leu Thr Lys Ile Asn Gln 915 920 925		
Asn Gly Met Pro Ala Trp Asp Ser Thr Gly Arg Thr Leu Tyr Thr Lys 930 935 940		
Pro Val His Ile Trp Asp Met Thr Thr Gly Thr Val Ala Ser Phe Glu 945 950 955 960		
Thr Arg Phe Ser Phe Ser Ile Glu Gln Pro Tyr Thr Arg Pro Leu Pro 965 970 975		
Ala Asp Gly Leu Val Phe Phe Met Gly Pro Thr Lys Ser Lys Pro Ala 980 985 990		
Gln Gly Tyr Gly Tyr Leu Gly Val Phe Asn Asn Ser Lys Gln Asp Asn 995 1000 1005		
Ser Tyr Gln Thr Leu Ala Val Glu Phe Asp Thr Phe Ser Asn Pro 1010 1015 1020		
Trp Asp Pro Pro Gln Val Pro His Ile Gly Ile Asp Val Asn Ser 1025 1030 1035		

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Ile Arg Ser Ile Lys Thr Gln Pro Phe Gln Leu Asp Asn Gly Gln  
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 Val Ala Asn Val Val Ile Lys Tyr Asp Ala Ser Ser Lys Ile Leu  
 1055 1060 1065  
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 1070 1075 1080  
 Ala Glu Ile Val Asp Val Lys Gln Val Leu Pro Glu Trp Val Asp  
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 Val Gly Leu Ser Gly Ala Thr Gly Ala Gln Arg Asp Ala Ala Glu  
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 <213> Clostridium tetani

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 gatcgtatatt ggatagtgcc ggaaagggtat gaatttgga caaaacctga agatttttaac 180  
 ccaccatctt cattaataga aggtgcatct gagtattacg atccaaatta ttttaaggact 240  
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 aatgtagcag gtgaagcctt attagataag ataataaatg ccatacctta ccttggaat 360  
 tcatattcct tactagacaa gtttgataca aactctaatt cagtatcttt taatttatta 420  
 gaacaagacc ccagtggagc aactacaaaa tcagcaatgc tgacaaattt aataatattt 480  
 ggacctgggc ctgtttttaa taaaaatgag gtttagaggtta ttgtattgag ggtagataat 540  
 aaaaattact tcccatgtag agatgggttt ggctcaataa tgcaaatggc attttgccca 600  
 gaatatgtac ctacctttga taatgtaata gaaaatatta cgtcactcac tattggcaaa 660  
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 ggtttatacg gaatgcaggt atcaagccat gaaattatc catccaaaca agaaatttat 780  
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 aatcttataa gtattgatat aaaaaacgat ttatatgaaa aaacttttaa tgattataaa 900  
 gctatagcta acaaacttag tcaagtcact agctgcaatg atcccaacat tgatattgat 960

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gtatctgcta	gtcatttaga	acaatatggc	acaaatgagt	attcaataat	tagctctatg	2940



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aaaaaacata gtctatcaat aggatctggt tggagtgtat cacttaaagg taataactta 3000
atatggactt taaaagattc cgcgggagaa gttagacaaa taacttttag ggatttacct 3060
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 <212> PRT  
 <213> Clostridium tetani

<400> 141

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Asp Thr Ile Ile Met Met Glu Pro Pro Tyr Cys Lys Gly Leu Asp Ile
          20           25           30

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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Val Pro Glu
          35           40           45

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Arg Tyr Glu Phe Gly Thr Lys Pro Glu Asp Phe Asn Pro Pro Ser Ser
          50           55           60

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Leu Ile Glu Gly Ala Ser Glu Tyr Tyr Asp Pro Asn Tyr Leu Arg Thr
65           70           75           80

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Asp Ser Asp Lys Asp Arg Phe Leu Gln Thr Met Val Lys Leu Phe Asn
          85           90           95

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Arg Ile Lys Asn Asn Val Ala Gly Glu Ala Leu Leu Asp Lys Ile Ile  
 100 105 110

Asn Ala Ile Pro Tyr Leu Gly Asn Ser Tyr Ser Leu Leu Asp Lys Phe  
 115 120 125

Asp Thr Asn Ser Asn Ser Val Ser Phe Asn Leu Leu Glu Gln Asp Pro  
 130 135 140

Ser Gly Ala Thr Thr Lys Ser Ala Met Leu Thr Asn Leu Ile Ile Phe  
 145 150 155 160

Gly Pro Gly Pro Val Leu Asn Lys Asn Glu Val Arg Gly Ile Val Leu  
 165 170 175

Arg Val Asp Asn Lys Asn Tyr Phe Pro Cys Arg Asp Gly Phe Gly Ser  
 180 185 190

Ile Met Gln Met Ala Phe Cys Pro Glu Tyr Val Pro Thr Phe Asp Asn  
 195 200 205

Val Ile Glu Asn Ile Thr Ser Leu Thr Ile Gly Lys Ser Lys Tyr Phe  
 210 215 220

Gln Asp Pro Ala Leu Leu Leu Met His Glu Leu Ile His Val Leu His  
 225 230 235 240

Gly Leu Tyr Gly Met Gln Val Ser Ser His Glu Ile Ile Pro Ser Lys  
 245 250 255

Gln Glu Ile Tyr Met Gln His Thr Tyr Pro Ile Ser Ala Glu Glu Leu  
 260 265 270

Phe Thr Phe Gly Gly Gln Asp Ala Asn Leu Ile Ser Ile Asp Ile Lys  
 275 280 285

Asn Asp Leu Tyr Glu Lys Thr Leu Asn Asp Tyr Lys Ala Ile Ala Asn  
 290 295 300

Lys Leu Ser Gln Val Thr Ser Cys Asn Asp Pro Asn Ile Asp Ile Asp  
 305 310 315 320

Ser Tyr Lys Gln Ile Tyr Gln Gln Lys Tyr Gln Phe Asp Lys Asp Ser  
 325 330 335

Asn Gly Gln Tyr Ile Val Asn Glu Asp Lys Phe Gln Ile Leu Tyr Asn  
 340 345 350

Ser Ile Met Tyr Gly Phe Thr Glu Ile Glu Leu Gly Lys Lys Phe Asn  
 355 360 365

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Ile Lys Thr Arg Leu Ser Tyr Phe Ser Met Asn His Asp Pro Val Lys  
 370 375 380

Ile Pro Asn Leu Leu Asp Asp Thr Ile Tyr Asn Asp Thr Glu Gly Phe  
 385 390 395 400

Asn Ile Glu Ser Lys Asp Leu Lys Ser Glu Tyr Lys Gly Gln Asn Met  
 405 410 415

Arg Val Asn Thr Asn Ala Phe Arg Asn Val Asp Gly Ser Gly Leu Val  
 420 425 430

Ser Lys Leu Ile Gly Leu Cys Lys Lys Ile Ile Pro Pro Thr Asn Ile  
 435 440 445

Arg Glu Asn Leu Tyr Asn Arg Thr Ala Ser Leu Thr Asp Leu Gly Gly  
 450 455 460

Glu Leu Cys Ile Lys Ile Lys Asn Glu Asp Leu Thr Phe Ile Ala Glu  
 465 470 475 480

Lys Asn Ser Phe Ser Glu Glu Pro Phe Gln Asp Glu Ile Val Ser Tyr  
 485 490 495

Asn Thr Lys Asn Lys Pro Leu Asn Phe Asn Tyr Ser Leu Asp Lys Ile  
 500 505 510

Ile Val Asp Tyr Asn Leu Gln Ser Lys Ile Thr Leu Pro Asn Asp Arg  
 515 520 525

Thr Thr Pro Val Thr Lys Gly Ile Pro Tyr Ala Pro Glu Tyr Lys Ser  
 530 535 540

Asn Ala Ala Ser Thr Ile Glu Ile His Asn Ile Asp Asp Asn Thr Ile  
 545 550 555 560

Tyr Gln Tyr Leu Tyr Ala Gln Lys Ser Pro Thr Thr Leu Gln Arg Ile  
 565 570 575

Thr Met Thr Asn Ser Val Asp Asp Ala Leu Ile Asn Ser Thr Lys Ile  
 580 585 590

Tyr Ser Tyr Phe Pro Ser Val Ile Ser Lys Val Asn Gln Gly Ala Gln  
 595 600 605

Gly Ile Leu Phe Leu Gln Trp Val Arg Asp Ile Ile Asp Asp Phe Thr  
 610 615 620

Asn Glu Ser Ser Gln Lys Thr Thr Ile Asp Lys Ile Ser Asp Val Ser

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625		630		635		640
Thr Ile Val Pro Tyr	Ile Gly Pro Ala Leu Asn Ile Val Lys Gln Gly					
	645		650			655
Tyr Glu Gly Asn Phe Ile Gly Ala Leu Glu Thr Thr Gly Val Val Leu						
	660		665			670
Leu Leu Glu Tyr Ile Pro Glu Ile Thr Leu Pro Val Ile Ala Ala Leu						
	675		680			685
Ser Ile Ala Glu Ser Ser Thr Gln Lys Glu Lys Ile Ile Lys Thr Ile						
	690		695			700
Asp Asn Phe Leu Glu Lys Arg Tyr Glu Lys Trp Ile Glu Val Tyr Lys						
	705		710		715	720
Leu Val Lys Ala Lys Trp Leu Gly Thr Val Asn Thr Gln Phe Gln Lys						
		725		730		735
Arg Ser Tyr Gln Met Tyr Arg Ser Leu Glu Tyr Gln Val Asp Ala Ile						
		740		745		750
Lys Lys Ile Ile Asp Tyr Glu Tyr Lys Ile Tyr Ser Gly Pro Asp Lys						
	755		760			765
Glu Gln Ile Ala Asp Glu Ile Asn Asn Leu Lys Asn Lys Leu Glu Glu						
	770		775			780
Lys Ala Asn Lys Ala Met Ile Asn Ile Asn Ile Phe Met Arg Glu Ser						
	785		790		795	800
Ser Arg Ser Phe Leu Val Asn Gln Met Ile Asn Glu Ala Lys Lys Gln						
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Leu Leu Glu Phe Asp Thr Gln Ser Lys Asn Ile Leu Met Gln Tyr Ile						
		820		825		830
Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu Leu Lys Lys Leu Glu						
	835		840			845
Ser Lys Ile Asn Lys Val Phe Ser Thr Pro Ile Pro Phe Ser Tyr Ser						
	850		855			860
Lys Asn Leu Asp Cys Trp Val Asp Asn Glu Glu Asp Ile Asp Val Ile						
	865		870		875	880
Leu Lys Lys Ser Thr Ile Leu Asn Leu Asp Ile Asn Asn Asp Ile Ile						
		885		890		895

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Ser Asp Ile Ser Gly Phe Asn Ser Ser Val Ile Thr Tyr Pro Asp Ala  
 900 905 910

Gln Leu Val Pro Gly Ile Asn Gly Lys Ala Ile His Leu Val Asn Asn  
 915 920 925

Glu Ser Ser Glu Val Ile Val His Lys Ala Met Asp Ile Glu Tyr Asn  
 930 935 940

Asp Met Phe Asn Asn Phe Thr Val Ser Phe Trp Leu Arg Val Pro Lys  
 945 950 955 960

Val Ser Ala Ser His Leu Glu Gln Tyr Gly Thr Asn Glu Tyr Ser Ile  
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Ile Ser Ser Met Lys Lys His Ser Leu Ser Ile Gly Ser Gly Trp Ser  
 980 985 990

Val Ser Leu Lys Gly Asn Asn Leu Ile Trp Thr Leu Lys Asp Ser Ala  
 995 1000 1005

Gly Glu Val Arg Gln Ile Thr Phe Arg Asp Leu Pro Asp Lys Phe  
 1010 1015 1020

Asn Ala Tyr Leu Ala Asn Lys Trp Val Phe Ile Thr Ile Thr Asn  
 1025 1030 1035

Asp Arg Leu Ser Ser Ala Asn Leu Tyr Ile Asn Gly Val Leu Met  
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Gly Ser Ala Glu Ile Thr Gly Leu Gly Ala Ile Arg Glu Asp Asn  
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Asn Ile Thr Leu Lys Leu Asp Arg Cys Asn Asn Asn Asn Gln Tyr  
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Val Ser Ile Asp Lys Phe Arg Ile Phe Cys Lys Ala Leu Asn Pro  
 1085 1090 1095

Lys Glu Ile Glu Lys Leu Tyr Thr Ser Tyr Leu Ser Ile Thr Phe  
 1100 1105 1110

Leu Arg Asp Phe Trp Gly Asn Pro Leu Arg Tyr Asp Thr Glu Tyr  
 1115 1120 1125

Tyr Leu Ile Pro Val Ala Ser Ser Ser Lys Asp Val Gln Leu Lys  
 1130 1135 1140

Asn Ile Thr Asp Tyr Met Tyr Leu Thr Asn Ala Pro Ser Tyr Thr  
 1145 1150 1155

- 378 -

Asn Gly Lys Leu Asn Ile Tyr Tyr Arg Arg Leu Tyr Asn Gly Leu  
1160 1165 1170

Lys Phe Ile Ile Lys Arg Tyr Thr Pro Asn Asn Glu Ile Asp Ser  
1175 1180 1185

Phe Val Lys Ser Gly Asp Phe Ile Lys Leu Tyr Val Ser Tyr Asn  
1190 1195 1200

Asn Asn Glu His Ile Val Gly Tyr Pro Lys Asp Gly Asn Ala Phe  
1205 1210 1215

Asn Asn Leu Asp Arg Ile Leu Arg Val Gly Tyr Asn Ala Pro Gly  
1220 1225 1230

Ile Pro Leu Tyr Lys Lys Met Glu Ala Val Lys Leu Arg Asp Leu  
1235 1240 1245

Lys Thr Tyr Ser Val Gln Leu Lys Leu Tyr Asp Asp Lys Asn Ala  
1250 1255 1260

Ser Leu Gly Leu Val Gly Thr His Asn Gly Gln Ile Gly Asn Asp  
1265 1270 1275

Pro Asn Arg Asp Ile Leu Ile Ala Ser Asn Trp Tyr Phe Asn His  
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Leu Lys Asp Lys Ile Leu Gly Cys Asp Trp Tyr Phe Val Pro Thr  
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Asp Glu Gly Trp Thr Asn Asp  
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aatcttataa	gtattgatat	aaaaaacgat	ttatatgaaa	aaactttaaa	tgattataaa	900
gctatagcta	acaaacttag	tcaagtcact	agctgcaatg	atcccaacat	tgatattgat	960
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- 380 -

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 <213> Clostridium tetani

<400> 143

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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Val Pro Glu  
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Arg Tyr Glu Phe Gly Thr Lys Pro Glu Asp Phe Asn Pro Pro Ser Ser  
 50 55 60

Leu Ile Glu Gly Ala Ser Glu Tyr Tyr Asp Pro Asn Tyr Leu Arg Thr  
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Asp Ser Asp Lys Asp Arg Phe Leu Gln Thr Met Val Lys Leu Phe Asn  
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Arg Ile Lys Asn Asn Val Ala Gly Glu Ala Leu Leu Asp Lys Ile Ile  
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Asn Ala Ile Pro Tyr Leu Gly Asn Ser Tyr Ser Leu Leu Asp Lys Phe  
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Asp Thr Asn Ser Asn Ser Val Ser Phe Asn Leu Leu Glu Gln Asp Pro  
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Ser Gly Ala Thr Thr Lys Ser Ala Met Leu Thr Asn Leu Ile Ile Phe  
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Gly Pro Gly Pro Val Leu Asn Lys Asn Glu Val Arg Gly Ile Val Leu  
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Arg Val Asp Asn Lys Asn Tyr Phe Pro Cys Arg Asp Gly Phe Gly Ser  
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Ile Met Gln Met Ala Phe Cys Pro Glu Tyr Val Pro Thr Phe Asp Asn  
 195 200 205



- 381 -

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 Gln Asp Pro Ala Leu Leu Leu Met His Glu Leu Ile His Val Leu His  
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 Gly Leu Tyr Gly Met Gln Val Ser Ser His Glu Ile Ile Pro Ser Lys  
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 Arg Val Asn Thr Asn Ala Phe Arg Asn Val Asp Gly Ser Gly Leu Val  
 420 425 430  
 Ser Lys Leu Ile Gly Leu Cys Lys Lys Ile Ile Pro Pro Thr Asn Ile  
 435 440 445  
 Arg Glu Asn Leu Tyr Asn Arg Thr Ala Ser Leu Thr Asp Leu Gly Gly  
 450 455 460  
 Glu Leu Cys Ile Lys Ile Lys Asn Glu Asp Leu Thr Phe Ile Ala Glu  
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- 382 -

Lys Asn Ser Phe Ser Glu Glu Pro Phe Gln Asp Glu Ile Val Ser Tyr  
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Asn Thr Lys Asn Lys Pro Leu Asn Phe Asn Tyr Ser Leu Asp Lys Ile  
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Ile Val Asp Tyr Asn Leu Gln Ser Lys Ile Thr Leu Pro Asn Asp Arg  
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Thr Thr Pro Val Thr Lys Gly Ile Pro Tyr Ala Pro Glu Tyr Lys Ser  
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Asn Ala Ala Ser Thr Ile Glu Ile His Asn Ile Asp Asp Asn Thr Ile  
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Tyr Gln Tyr Leu Tyr Ala Gln Lys Ser Pro Thr Thr Leu Gln Arg Ile  
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Thr Met Thr Asn Ser Val Asp Asp Ala Leu Ile Asn Ser Thr Lys Ile  
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Tyr Ser Tyr Phe Pro Ser Val Ile Ser Lys Val Asn Gln Gly Ala Gln  
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Gly Ile Leu Phe Leu Gln Trp Val Arg Asp Ile Ile Asp Asp Phe Thr  
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Asn Glu Ser Ser Gln Lys Thr Thr Ile Asp Lys Ile Ser Asp Val Ser  
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Thr Ile Val Pro Tyr Ile Gly Pro Ala Leu Asn Ile Val Lys Gln Gly  
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Tyr Glu Gly Asn Phe Ile Gly Ala Leu Glu Thr Thr Gly Val Val Leu  
                     660                    665                    670

Leu Leu Glu Tyr Ile Pro Glu Ile Thr Leu Pro Val Ile Ala Ala Leu  
                     675                    680                    685

Ser Ile Ala Glu Ser Ser Thr Gln Lys Glu Lys Ile Ile Lys Thr Ile  
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Asp Asn Phe Leu Glu Lys Arg Tyr Glu Lys Trp Ile Glu Val Tyr Lys  
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 <212> PRT

- 385 -

&lt;213&gt; Clostridium tetani

&lt;400&gt; 145

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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Val Pro Glu  
 35 40 45

Arg Tyr Glu Phe Gly Thr Lys Pro Glu Asp Phe Asn Pro Pro Ser Ser  
 50 55 60

Leu Ile Glu Gly Ala Ser\_Glu Tyr Tyr Asp Pro Asn Tyr Leu Arg Thr  
 65 70 75 80

Asp Ser Asp Lys Asp Arg Phe Leu Gln Thr Met Val Lys Leu Phe Asn  
 85 90 95

Arg Ile Lys Asn Asn Val Ala Gly Glu Ala Leu Leu Asp Lys Ile Ile  
 100 105 110

Asn Ala Ile Pro Tyr Leu Gly Asn Ser Tyr Ser Leu Leu Asp Lys Phe  
 115 120 125

Asp Thr Asn Ser Asn Ser Val Ser Phe Asn Leu Leu Glu Gln Asp Pro  
 130 135 140

Ser Gly Ala Thr Thr Lys Ser Ala Met Leu Thr Asn Leu Ile Ile Phe  
 145 150 155 160

Gly Pro Gly Pro Val Leu Asn Lys Asn Glu Val Arg Gly Ile Val Leu  
 165 170 175

Arg Val Asp Asn Lys Asn Tyr Phe Pro Cys Arg Asp Gly Phe Gly Ser  
 180 185 190

Ile Met Gln Met Ala Phe Cys Pro Glu Tyr Val Pro Thr Phe Asp Asn  
 195 200 205

Val Ile Glu Asn Ile Thr Ser Leu Thr Ile Gly Lys Ser Lys Tyr Phe  
 210 215 220

Gln Asp Pro Ala Leu Leu Leu Met His Glu Leu Ile His Val Leu His  
 225 230 235 240

Gly Leu Tyr Gly Met Gln Val Ser Ser His Glu Ile Ile Pro Ser Lys  
 245 250 255

- 386 -

Gln Glu Ile Tyr Met Gln His Thr Tyr Pro Ile Ser Ala Glu Glu Leu  
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Phe Thr Phe Gly Gly Gln Asp Ala Asn Leu Ile Ser Ile Asp Ile Lys  
 275 280 285

Asn Asp Leu Tyr Glu Lys Thr Leu Asn Asp Tyr Lys Ala Ile Ala Asn  
 290 295 300

Lys Leu Ser Gln Val Thr Ser Cys Asn Asp Pro Asn Ile Asp Ile Asp  
 305 310 315 320

Ser Tyr Lys Gln Ile Tyr Gln Gln Lys Tyr Gln Phe Asp Lys Asp Ser  
 325 330 335

Asn Gly Gln Tyr Ile Val Asn Glu Asp Lys Phe Gln Ile Leu Tyr Asn  
 340 345 350

Ser Ile Met Tyr Gly Phe Thr Glu Ile Glu Leu Gly Lys Lys Phe Asn  
 355 360 365

Ile Lys Thr Arg Leu Ser Tyr Phe Ser Met Asn His Asp Pro Val Lys  
 370 375 380

Ile Pro Asn Leu Leu Asp Asp Thr Ile Tyr Asn Asp Thr Glu Gly Phe  
 385 390 395 400

Asn Ile Glu Ser Lys Asp Leu Lys Ser Glu Tyr Lys Gly Gln Asn Met  
 405 410 415

Arg Val Asn Thr Asn Ala Phe Arg Asn Val Asp Gly Ser Gly Leu Val  
 420 425 430

Ser Lys Leu Ile Gly Leu Cys Lys Ser Glu Glu Lys Leu Tyr Asp Asp  
 435 440 445

Asp Asp Lys Asp Arg Trp Gly Ser Ser Arg Ile Cys Ile Lys Ile Lys  
 450 455 460

Asn Glu Asp Leu Thr Phe Ile Ala Glu Lys Asn Ser Phe Ser Glu Glu  
 465 470 475 480

Pro Phe Gln Asp Glu Ile Val Ser Tyr Asn Thr Lys Asn Lys Pro Leu  
 485 490 495

Asn Phe Asn Tyr Ser Leu Asp Lys Ile Ile Val Asp Tyr Asn Leu Gln  
 500 505 510

Ser Lys Ile Thr Leu Pro Asn Asp Arg Thr Thr Pro Val Thr Lys Gly

515	520	525
Ile Pro Tyr Ala Pro Glu Tyr Lys Ser Asn Ala Ala Ser Thr Ile Glu 530 535 540		
Ile His Asn Ile Asp Asp Asn Thr Ile Tyr Gln Tyr Leu Tyr Ala Gln 545 550 555 560		
Lys Ser Pro Thr Thr Leu Gln Arg Ile Thr Met Thr Asn Ser Val Asp 565 570 575		
Asp Ala Leu Ile Asn Ser Thr Lys Ile Tyr Ser Tyr Phe Pro Ser Val 580 585 590		
Ile Ser Lys Val Asn Gln Gly Ala Gln Gly Ile Leu Phe Leu Gln Trp 595 600 605		
Val Arg Asp Ile Ile Asp Asp Phe Thr Asn Glu Ser Ser Gln Lys Thr 610 615 620		
Thr Ile Asp Lys Ile Ser Asp Val Ser Thr Ile Val Pro Tyr Ile Gly 625 630 635 640		
Pro Ala Leu Asn Ile Val Lys Gln Gly Tyr Glu Gly Asn Phe Ile Gly 645 650 655		
Ala Leu Glu Thr Thr Gly Val Val Leu Leu Leu Glu Tyr Ile Pro Glu 660 665 670		
Ile Thr Leu Pro Val Ile Ala Ala Leu Ser Ile Ala Glu Ser Ser Thr 675 680 685		
Gln Lys Glu Lys Ile Ile Lys Thr Ile Asp Asn Phe Leu Glu Lys Arg 690 695 700		
Tyr Glu Lys Trp Ile Glu Val Tyr Lys Leu Val Lys Ala Lys Trp Leu 705 710 715 720		
Gly Thr Val Asn Thr Gln Phe Gln Lys Arg Ser Tyr Gln Met Tyr Arg 725 730 735		
Ser Leu Glu Tyr Gln Val Asp Ala Ile Lys Lys Ile Ile Asp Tyr Glu 740 745 750		
Tyr Lys Ile Tyr Ser Gly Pro Asp Lys Glu Gln Ile Ala Asp Glu Ile 755 760 765		
Asn Asn Leu Lys Asn Lys Leu Glu Glu Lys Ala Asn Lys Ala Met Ile 770 775 780		

- 388 -

Asn Ile Asn Ile Phe Met Arg Glu Ser Ser Arg Ser Phe Leu Val Asn  
785 790 795 800

Gln Met Ile Asn Glu Ala Lys Lys Gln Leu Leu Glu Phe Asp Thr Gln  
805 810 815

Ser Lys Asn Ile Leu Met Gln Tyr Ile Lys Ala Asn Ser Lys Phe Ile  
820 825 830

Gly Ile Thr Glu Leu Lys Lys Leu Glu Ser Lys Ile Asn Lys Val Phe  
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Ser Thr Pro Ile Pro Phe Ser Tyr Ser Lys Asn Leu Asp Cys Trp Val  
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<212> PRT
<213> Clostridium tetani

<400> 147

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Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Val Pro Glu  
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Arg Tyr Glu Phe Gly Thr Lys Pro Glu Asp Phe Asn Pro Pro Ser Ser  
50 55 60

Leu Ile Glu Gly Ala Ser Glu Tyr Tyr Asp Pro Asn Tyr Leu Arg Thr  
65 70 75 80

Asp Ser Asp Lys Asp Arg Phe Leu Gln Thr Met Val Lys Leu Phe Asn  
85 90 95

Arg Ile Lys Asn Asn Val Ala Gly Glu Ala Leu Leu Asp Lys Ile Ile  
100 105 110

Asn Ala Ile Pro Tyr Leu Gly Asn Ser Tyr Ser Leu Leu Asp Lys Phe  
115 120 125

Asp Thr Asn Ser Asn Ser Val Ser Phe Asn Leu Leu Glu Gln Asp Pro  
130 135 140

Ser Gly Ala Thr Thr Lys Ser Ala Met Leu Thr Asn Leu Ile Ile Phe  
145 150 155 160

Gly Pro Gly Pro Val Leu Asn Lys Asn Glu Val Arg Gly Ile Val Leu  
165 170 175

Arg Val Asp Asn Lys Asn Tyr Phe Pro Cys Arg Asp Gly Phe Gly Ser  
180 185 190

Ile Met Gln Met Ala Phe Cys Pro Glu Tyr Val Pro Thr Phe Asp Asn  
195 200 205

Val Ile Glu Asn Ile Thr Ser Leu Thr Ile Gly Lys Ser Lys Tyr Phe  
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Gln Asp Pro Ala Leu Leu Leu Met His Glu Leu Ile His Val Leu His  
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Gly Leu Tyr Gly Met Gln Val Ser Ser His Glu Ile Ile Pro Ser Lys  
245 250 255

Gln Glu Ile Tyr Met Gln His Thr Tyr Pro Ile Ser Ala Glu Glu Leu  
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Phe Thr Phe Gly Gly Gln Asp Ala Asn Leu Ile Ser Ile Asp Ile Lys  
275 280 285

- 391 -

Asn Asp Leu Tyr Glu Lys Thr Leu Asn Asp Tyr Lys Ala Ile Ala Asn  
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Lys Leu Ser Gln Val Thr Ser Cys Asn Asp Pro Asn Ile Asp Ile Asp  
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Ser Tyr Lys Gln Ile Tyr Gln Gln Lys Tyr Gln Phe Asp Lys Asp Ser  
 325 330 335

Asn Gly Gln Tyr Ile Val Asn Glu Asp Lys Phe Gln Ile Leu Tyr Asn  
 340 345 350

Ser Ile Met Tyr Gly Phe Thr Glu Ile Glu Leu Gly Lys Lys Phe Asn  
 355 360 365

Ile Lys Thr Arg Leu Ser Tyr Phe Ser Met Asn His Asp Pro Val Lys  
 370 375 380

Ile Pro Asn Leu Leu Asp Asp Thr Ile Tyr Asn Asp Thr Glu Gly Phe  
 385 390 395 400

Asn Ile Glu Ser Lys Asp Leu Lys Ser Glu Tyr Lys Gly Gln Asn Met  
 405 410 415

Arg Val Asn Thr Asn Ala Phe Arg Asn Val Asp Gly Ser Gly Leu Val  
 420 425 430

Ser Lys Leu Ile Gly Leu Cys Lys Lys Ile Ile Pro Pro Thr Asn Ile  
 435 440 445

Arg Glu Asn Leu Tyr Asn Arg Thr Ala Ser Leu Thr Asp Leu Gly Gly  
 450 455 460

Glu Leu Cys Ile Lys Ile Lys Asn Glu Asp Leu Thr Phe Ile Ala Glu  
 465 470 475 480

Lys Asn Ser Phe Ser Glu Glu Pro Phe Gln Asp Glu Ile Val Ser Tyr  
 485 490 495

Asn Thr Lys Asn Lys Pro Leu Asn Phe Asn Tyr Ser Leu Asp Lys Ile  
 500 505 510

Ile Val Asp Tyr Asn Leu Gln Ser Lys Ile Thr Leu Pro Asn Asp Arg  
 515 520 525

Thr Thr Pro Val Thr Lys Gly Ile Pro Tyr Ala Pro Glu Tyr Lys Ser  
 530 535 540

Asn Ala Ala Ser Thr Ile Glu Ile His Asn Ile Asp Asp Asn Thr Ile

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545		550		555		560
Tyr Gln Tyr Leu Tyr Ala Gln Lys Ser Pro Thr Thr Leu Gln Arg Ile	565	570	575			
Thr Met Thr Asn Ser Val Asp Asp Ala Leu Ile Asn Ser Thr Lys Ile	580	585	590			
Tyr Ser Tyr Phe Pro Ser Val Ile Ser Lys Val Asn Gln Gly Ala Gln	595	600	605			
Gly Ile Leu Phe Leu Gln Trp Val Arg Asp Ile Ile Asp Asp Phe Thr	610	615	620			
Asn Glu Ser Ser Gln Lys Thr Thr Ile Asp Lys Ile Ser Asp Val Ser	625	630	635			640
Thr Ile Val Pro Tyr Ile Gly Pro Ala Leu Asn Ile Val Lys Gln Gly	645	650	655			
Tyr Glu Gly Asn Phe Ile Gly Ala Leu Glu Thr Thr Gly Val Val Leu	660	665	670			
Leu Leu Glu Tyr Ile Pro Glu Ile Thr Leu Pro Val Ile Ala Ala Leu	675	680	685			
Ser Ile Ala Glu Ser Ser Thr Gln Lys Glu Lys Ile Ile Lys Thr Ile	690	695	700			
Asp Asn Phe Leu Glu Lys Arg Tyr Glu Lys Trp Ile Glu Val Tyr Lys	705	710	715			720
Leu Val Lys Ala Lys Trp Leu Gly Thr Val Asn Thr Gln Phe Gln Lys	725	730	735			
Arg Ser Tyr Gln Met Tyr Arg Ser Leu Glu Tyr Gln Val Asp Ala Ile	740	745	750			
Lys Lys Ile Ile Asp Tyr Glu Tyr Lys Ile Tyr Ser Gly Pro Asp Lys	755	760	765			
Glu Gln Ile Ala Asp Glu Ile Asn Asn Leu Lys Asn Lys Leu Glu Glu	770	775	780			
Lys Ala Asn Lys Ala Met Ile Asn Ile Asn Ile Phe Met Arg Glu Ser	785	790	795			800
Ser Arg Ser Phe Leu Val Asn Gln Met Ile Asn Glu Ala Lys Lys Gln	805	810	815			

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Leu Leu Glu Phe Asp Thr Gln Ser Lys Asn Ile Leu Met Gln Tyr Ile  
820 825 830

Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu Leu Lys Lys Leu Glu  
835 840 845

Ser Lys Ile Asn Lys Val Phe Ser Thr Pro Ile Pro Phe Ser Tyr Ser  
850 855 860

Lys Asn Leu Asp Cys Trp Val Asp Asn Glu Glu Asp Ile Asp Val Ile  
865 870 875 880

Leu Lys Lys Ser Thr Ile Leu  
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Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val  
1 5 10 15  
aac ggt gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg 96  
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20 25 30  
cag ccg gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg 144  
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
35 40 45  
gaa cgc gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg 192  
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
50 55 60  
ccg gaa gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg 240  
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
65 70 75 80  
agc aca gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta 288  
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
85 90 95  
ttc gag cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca 336  
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
100 105 110  
atc gtc cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag 384  
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
115 120 125  
ttg aag gtt att gac act aac tgc att aac gtg atc caa cca gac ggt 432  
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
130 135 140

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agc tac aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg Ser Tyr Arg Ser Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala 145 150 155 160	480
gac att atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn 165 170 175	528
ctg acg cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro 180 185 190	576
gac ttc acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro 195 200 205	624
ctg ttg ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala 210 215 220	672
cac gag ctg atc cac gcc ggt cat cgt ctg tat ggc att gcg att aac His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn 225 230 235 240	720
ccg aac cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser 245 250 255	768
ggt tta gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp 260 265 270	816
gcg aag ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr 275 280 285	864
tac aac aag ttt aaa gat att gca agt aca ctg aac aag gct aag tcc Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser 290 295 300	912
att gtg ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys 305 310 315 320	960
gag aaa tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp 325 330 335	1008
aaa tta aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr 340 345 350	1056
gag gat aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr 355 360 365	1104
ttg aat ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val 370 375 380	1152
aat tac aca ata tat gat gga ttt aat tta aga aat aca aat tta gca Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala 385 390 395 400	1200
gca aac ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr	1248

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405	410	415	
aaa cta aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys 420 425 430			1296
gta aga ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr 435 440 445			1344
aat aag gca tta aat gat tta tgt atc aaa gtt aat aat tgg gac ttg Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu 450 455 460			1392
ttt ttt agt cct tca gaa gat aat ttt act aat gat cta aat aaa gga Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly 465 470 475 480			1440
gaa gaa att aca tct gat act aat ata gaa gca gca gaa gaa aat att Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile 485 490 495			1488
agt tta gat tta ata caa caa tat tat tta acc ttt aat ttt gat aat Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn 500 505 510			1536
gaa cct gaa aat att tca ata gaa aat ctt tca agt gac att ata ggc Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly 515 520 525			1584
caa tta gaa ctt atg cct aat ata gaa aga ttt cct aat gga aaa aag Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys 530 535 540			1632
tat gag tta gat aaa tat act atg ttc cat tat ctt cgt gct caa gaa Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu 545 550 555 560			1680
ttt gaa cat ggt aaa tct agg att gct tta aca aat tct gtt aac gaa Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu 565 570 575			1728
gca tta tta aat cct agt cgt gtt tat aca ttt ttt tct tca gac tat Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr 580 585 590			1776
gta aag aaa gtt aat aaa gct acg gag gca gct atg ttt tta ggc tgg Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp 595 600 605			1824
gta gaa caa tta gta tat gat ttt acc gat gaa act agc gaa gta agt Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser 610 615 620			1872
act acg gat aaa att gcg gat ata act ata att att cca tat ata gga Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly 625 630 635 640			1920
cct gct tta aat ata ggt aat atg tta tat aaa gat gat ttt gta ggt Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly 645 650 655			1968
gct tta ata ttt tca gga gct gtt att ctg tta gaa ttt ata cca gag Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu 660 665 670			2016

att gca ata cct gta tta ggt act ttt gca ctt gta tca tat att gcg 2064  
 Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala  
 675 680 685

aat aag gtt cta acc gtt caa aca ata gat aat gct tta agt aaa aga 2112  
 Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg  
 690 695 700

aat gaa aaa tgg gat gag gtc tat aaa tat ata gta aca aat tgg tta 2160  
 Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu  
 705 710 715 720

gca aag gtt aat aca cag att gat cta ata aga aaa aaa atg aaa gaa 2208  
 Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu  
 725 730 735

gct tta gaa aat caa gca gaa gca aca aag gct ata ata aac tat cag 2256  
 Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln  
 740 745 750

tat aat caa tat act gag gaa gag aaa aat aat att aat ttt aat att 2304  
 Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile  
 755 760 765

gat gat tta agt tcg aaa ctt aat gag tct ata aat aaa gct atg att 2352  
 Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile  
 770 775 780

aat ata aat aaa ttt ttg aat caa tgc tct gtt tca tat tta atg aat 2400  
 Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn  
 785 790 795 800

tct atg atc cct tat ggt gtt aaa cgg tta gaa gat ttt gat gct agt 2448  
 Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser  
 805 810 815

ctt aaa gat gca tta tta aag tat ata tat gat aat aga gga act tta 2496  
 Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu  
 820 825 830

att ggt caa gta gat aga tta aaa gat aaa gtt aat aat aca ctt agt 2544  
 Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser  
 835 840 845

aca gat ata cct ttt cag ctt tcc aaa tac gta gat aat caa aga tta 2592  
 Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
 850 855 860

tta tct aca ttt act gaa tat att aag 2619  
 Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
 865 870

&lt;210&gt; 149

&lt;211&gt; 873

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 149

Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val  
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Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
 20 25 30



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Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
 35 40 45

Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
 50 55 60

Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
 65 70 75 80

Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
 85 90 95

Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
 100 105 110

Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
 115 120 125

Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
 130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser

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290	295	300
Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys 305 310 315 320		
Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp 325 330 335		
Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr 340 345 350		
Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr 355 360 365		
Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val 370 375 380		
Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala 385 390 395 400		
Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr 405 410 415		
Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys 420 425 430		
Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr 435 440 445		
Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu 450 455 460		
Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly 465 470 475 480		
Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile 485 490 495		
Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn 500 505 510		
Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly 515 520 525		
Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys 530 535 540		
Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu 545 550 555 560		

Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu  
565 570 575

Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr  
580 585 590

Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp  
595 600 605Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser  
610 615 620

Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly  
625 630 635 640

Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly  
645 650 655

Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu  
660 665 670

Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala  
675 680 685

Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg  
690 695 700

Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu  
705 710 715 720

Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu  
725 730 735

Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln  
740 745 750

Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile  
755 760 765

Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile  
770 775 780

Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn  
785 790 795 800

Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser  
805 810 815

Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu  
820 825 830

Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser  
835 840 845

Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
850 855 860

Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
865 870

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aac ggt gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg 96  
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20 25 30  
cag ccg gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg 144  
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
35 40 45  
gaa cgt gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca 192  
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
50 55 60  
ccg gaa gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg 240  
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
65 70 75 80  
tct acc gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg 288  
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
85 90 95  
ttc gag cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc 336  
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
100 105 110  
atc gtt cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa 384  
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
115 120 125  
ctg aaa gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt 432  
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
130 135 140  
tcc tat cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct 480  
Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
145 150 155 160  
gat atc atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac 528  
Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn

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165										170										175										
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Leu	Thr	Arg	Asn	Gly	Tyr	Gly	Ser	Thr	Gln	Tyr	Ile	Arg	Phe	Ser	Pro															
			180					185					190																	
gac	ttc	acc	ttc	ggg	ttt	gaa	gaa	tcc	ctg	gaa	gta	gac	acg	aac	cca					624										
Asp	Phe	Thr	Phe	Gly	Phe	Glu	Glu	Ser	Leu	Glu	Val	Asp	Thr	Asn	Pro															
		195					200					205																		
ctg	ctg	ggc	gct	ggg	aaa	ttc	gca	act	gat	cct	gcg	gtt	acc	ctg	gct					672										
Leu	Leu	Gly	Ala	Gly	Lys	Phe	Ala	Thr	Asp	Pro	Ala	Val	Thr	Leu	Ala															
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His	Glu	Leu	Ile	His	Ala	Gly	His	Arg	Leu	Tyr	Gly	Ile	Ala	Ile	Asn															
225					230					235					240															
ccg	aac	cgt	gtc	ttc	aaa	gtt	aac	acc	aac	gcg	tat	tac	gag	atg	tcc					768										
Pro	Asn	Arg	Val	Phe	Lys	Val	Asn	Thr	Asn	Ala	Tyr	Tyr	Glu	Met	Ser															
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ggg	ctg	gaa	gta	agc	ttc	gaa	gaa	ctg	cgt	act	ttt	ggc	ggg	cac	gac					816										
Gly	Leu	Glu	Val	Ser	Phe	Glu	Glu	Leu	Arg	Thr	Phe	Gly	Gly	His	Asp															
			260					265					270																	
gct	aaa	ttc	atc	gac	tct	ctg	caa	gaa	aac	gag	ttc	cgt	ctg	tac	tac					864										
Ala	Lys	Phe	Ile	Asp	Ser	Leu	Gln	Glu	Asn	Glu	Phe	Arg	Leu	Tyr	Tyr															
		275					280					285																		
tat	aac	aag	ttc	aaa	gat	atc	gca	tcc	acc	ctg	aac	aaa	gcg	aaa	tcc					912										
Tyr	Asn	Lys	Phe	Lys	Asp	Ile	Ala	Ser	Thr	Leu	Asn	Lys	Ala	Lys	Ser															
	290					295					300																			
atc	gtg	ggg	acc	act	gct	tct	ctg	cag	tac	atg	aag	aac	gtt	ttt	aaa					960										
Ile	Val	Gly	Thr	Thr	Ala	Ser	Leu	Gln	Tyr	Met	Lys	Asn	Val	Phe	Lys															
305					310					315					320															
gaa	aaa	tac	ctg	ctc	agc	gaa	gac	acc	tcc	ggc	aaa	ttc	tct	gta	gac					1008										
Glu	Lys	Tyr	Leu	Leu	Ser	Glu	Asp	Thr	Ser	Gly	Lys	Phe	Ser	Val	Asp															
				325					330					335																
aag	ttg	aaa	ttc	gat	aaa	ctt	tac	aaa	atg	ctg	act	gaa	att	tac	acc					1056										
Lys	Leu	Lys	Phe	Asp	Lys	Leu	Tyr	Lys	Met	Leu	Thr	Glu	Ile	Tyr	Thr															
			340					345					350																	
gaa	gac	aac	ttc	gtt	aag	ttc	ttt	aaa	gtt	ctg	aac	cgc	aaa	acc	tat					1104										
Glu	Asp	Asn	Phe	Val	Lys	Phe	Phe	Lys	Val	Leu	Asn	Arg	Lys	Thr	Tyr															
		355					360					365																		
ctg	aac	ttc	gac	aag	gca	gta	ttc	aaa	atc	aac	atc	gtg	ccg	aaa	gtt					1152										
Leu	Asn	Phe	Asp	Lys	Ala	Val	Phe	Lys	Ile	Asn	Ile	Val	Pro	Lys	Val															
	370					375					380																			
aac	tac	act	atc	tac	gat	ggg	ttc	aac	ctg	cgt	aac	acc	aac	ctg	gct					1200										
Asn	Tyr	Thr	Ile	Tyr	Asp	Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala															
385					390					395				400																
gct	aat	ttt	aac	ggc	cag	aac	acg	gaa	atc	aac	aac	atg	aac	ttc	aca					1248										
Ala	Asn	Phe	Asn	Gly	Gln	Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr															
			405					410						415																
aaa	ctg	aaa	aac	ttc	act	ggg	ctg	ttc	gag	ttt	tac	aag	ctg	ctg	tgc					1296										
Lys	Leu	Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu	Phe	Tyr	Lys	Leu	Leu	Cys															
			420					425					430																	

gta	cgt	ggc	atc	att	acc	tcc	aaa	act	aaa	tct	ctg	gac	aaa	ggg	tat	1344
Val	Arg	Gly	Ile	Ile	Thr	Ser	Lys	Thr	Lys	Ser	Leu	Asp	Lys	Gly	Tyr	
		435					440					445				
aac	aaa	gcg	ctg	aac	gac	ctc	tgt	atc	aag	gtt	aac	aac	tgg	gat	tta	1392
Asn	Lys	Ala	Leu	Asn	Asp	Leu	Cys	Ile	Lys	Val	Asn	Asn	Trp	Asp	Leu	
	450					455					460					
ttc	ttc	agc	ccg	agt	gaa	gac	aac	ttc	acc	aac	gac	ctg	aac	aaa	ggg	1440
Phe	Phe	Ser	Pro	Ser	Glu	Asp	Asn	Phe	Thr	Asn	Asp	Leu	Asn	Lys	Gly	
465					470					475					480	
gaa	gaa	atc	acc	tca	gat	act	aac	atc	gaa	gca	gcc	gaa	gaa	aac	atc	1488
Glu	Glu	Ile	Thr	Ser	Asp	Thr	Asn	Ile	Glu	Ala	Ala	Glu	Glu	Asn	Ile	
				485					490						495	
tcg	ctg	gac	ctg	atc	cag	cag	tac	tac	ctg	acc	ttt	aat	ttc	gac	aac	1536
Ser	Leu	Asp	Leu	Ile	Gln	Gln	Tyr	Tyr	Leu	Thr	Phe	Asn	Phe	Asp	Asn	
			500				505						510			
gag	ccg	gaa	aac	att	tct	atc	gaa	aac	ctg	agc	tct	gat	atc	atc	ggc	1584
Glu	Pro	Glu	Asn	Ile	Ser	Ile	Glu	Asn	Leu	Ser	Ser	Asp	Ile	Ile	Gly	
		515					520					525				
cag	ctg	gaa	ctg	atg	ccg	aac	atc	gaa	cgt	ttc	cca	aac	ggg	aaa	aag	1632
Gln	Leu	Glu	Leu	Met	Pro	Asn	Ile	Glu	Arg	Phe	Pro	Asn	Gly	Lys	Lys	
		530				535					540					
tac	gag	ctg	gac	aaa	tat	acc	atg	ttc	cac	tac	ctg	cgc	gcg	cag	gaa	1680
Tyr	Glu	Leu	Asp	Lys	Tyr	Thr	Met	Phe	His	Tyr	Leu	Arg	Ala	Gln	Glu	
545					550					555					560	
ttt	gaa	cac	ggc	aaa	tcc	cgt	atc	gca	ctg	act	aac	tcc	gtt	aac	gaa	1728
Phe	Glu	His	Gly	Lys	Ser	Arg	Ile	Ala	Leu	Thr	Asn	Ser	Val	Asn	Glu	
			565						570					575		
gct	ctg	ctc	aac	ccg	tcc	cgt	gta	tac	acc	ttc	ttc	tct	agc	gac	tac	1776
Ala	Leu	Leu	Asn	Pro	Ser	Arg	Val	Tyr	Thr	Phe	Phe	Ser	Ser	Asp	Tyr	
			580					585					590			
gtg	aaa	aag	gtc	aac	aaa	gcg	act	gaa	gct	gca	atg	ttc	ttg	ggg	tgg	1824
Val	Lys	Lys	Val	Asn	Lys	Ala	Thr	Glu	Ala	Ala	Met	Phe	Leu	Gly	Trp	
		595				600						605				
gtt	gaa	cag	ctt	gtt	tat	gat	ttt	acc	gac	gag	acg	tcc	gaa	gta	tct	1872
Val	Glu	Gln	Leu	Val	Tyr	Asp	Phe	Thr	Asp	Glu	Thr	Ser	Glu	Val	Ser	
	610					615					620					
act	acc	gac	aaa	att	gcg	gat	atc	act	atc	atc	atc	ccg	tac	atc	ggg	1920
Thr	Thr	Asp	Lys	Ile	Ala	Asp	Ile	Thr	Ile	Ile	Ile	Pro	Tyr	Ile	Gly	
625					630					635					640	
ccg	gct	ctg	aac	att	ggc	aac	atg	ctg	tac	aaa	gac	gac	ttc	gtt	ggg	1968
Pro	Ala	Leu	Asn	Ile	Gly	Asn	Met	Leu	Tyr	Lys	Asp	Asp	Phe	Val	Gly	
				645					650					655		
gca	ctg	atc	ttc	tcc	ggg	gcg	gtg	atc	ctg	ctg	gag	ttc	atc	ccg	gaa	2016
Ala	Leu	Ile	Phe	Ser	Gly	Ala	Val	Ile	Leu	Leu	Glu	Phe	Ile	Pro	Glu	
			660					665					670			
atc	gcc	atc	ccg	gta	ctg	ggc	acc	ttt	gct	ctg	gtt	tct	tac	att	gca	2064
Ile	Ala	Ile	Pro	Val	Leu	Gly	Thr	Phe	Ala	Leu	Val	Ser	Tyr	Ile	Ala	
		675					680					685				
aac	aag	gtt	ctg	act	gta	caa	acc	atc	gac	aac	gcg	ctg	agc	aaa	cgt	2112
Asn	Lys	Val	Leu	Thr	Val	Gln	Thr	Ile	Asp	Asn	Ala	Leu	Ser	Lys	Arg	

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690	695	700	
aac gaa aaa tgg gat gaa gtt tac aaa tat atc gtg acc aac tgg ctg			2160
Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu			
705	710	715	720
gct aag gtt aat act cag atc gac ctc atc cgc aaa aaa atg aaa gaa			2208
Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu			
	725	730	735
gca ctg gaa aac cag gcg gaa gct acc aag gca atc att aac tac cag			2256
Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln			
	740	745	750
tac aac cag tac acc gag gaa gaa aaa aac aac atc aac ttc aac atc			2304
Tyr Asn Gln Tyr Thr Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile			
	755	760	765
gac gat ctg tcc tct aaa ctg aac gaa tcc atc aac aaa gct atg atc			2352
Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile			
	770	775	780
aac atc aac aag ttc ctg aac cag tgc tct gta agc tat ctg atg aac			2400
Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn			
	785	790	800
tcc atg atc ccg tac ggt gtt aaa cgt ctg gag gac ttc gat gcg tct			2448
Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser			
	805	810	815
ctg aaa gac gcc ctg ctg aaa tac att tac gac aac cgt ggc act ctg			2496
Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu			
	820	825	830
atc ggt cag gtt gat cgt ctg aag gac aaa gtg aac aat acc tta tcg			2544
Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser			
	835	840	845
acc gac atc cct ttt cag ctc agt aaa tat gtc gat aac caa cgc ctt			2592
Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu			
	850	855	860
ttg agc acg ttc aca gag tac atc aag taa tga			2625
Leu Ser Thr Phe Thr Glu Tyr Ile Lys			
	865	870	

<210> 151  
 <211> 873  
 <212> PRT  
 <213> Clostridium botulinum

<400> 151

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 1 5 10 15

Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
 20 25 30

Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
 35 40 45

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Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
 50 55 60

Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
 65 70 75 80

Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
 85 90 95

Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
 100 105 110

Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
 115 120 125

Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
 130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320





580					585					590					
Val	Lys	Lys	Val	Asn	Lys	Ala	Thr	Glu	Ala	Ala	Met	Phe	Leu	Gly	Trp
	595						600					605			
Val	Glu	Gln	Leu	Val	Tyr	Asp	Phe	Thr	Asp	Glu	Thr	Ser	Glu	Val	Ser
	610					615					620				
Thr	Thr	Asp	Lys	Ile	Ala	Asp	Ile	Thr	Ile	Ile	Ile	Pro	Tyr	Ile	Gly
	625					630					635				640
Pro	Ala	Leu	Asn	Ile	Gly	Asn	Met	Leu	Tyr	Lys	Asp	Asp	Phe	Val	Gly
				645					650					655	
Ala	Leu	Ile	Phe	Ser	Gly	Ala	Val	Ile	Leu	Leu	Glu	Phe	Ile	Pro	Glu
			660					665					670		
Ile	Ala	Ile	Pro	Val	Leu	Gly	Thr	Phe	Ala	Leu	Val	Ser	Tyr	Ile	Ala
			675				680						685		
Asn	Lys	Val	Leu	Thr	Val	Gln	Thr	Ile	Asp	Asn	Ala	Leu	Ser	Lys	Arg
	690					695					700				
Asn	Glu	Lys	Trp	Asp	Glu	Val	Tyr	Lys	Tyr	Ile	Val	Thr	Asn	Trp	Leu
	705					710					715				720
Ala	Lys	Val	Asn	Thr	Gln	Ile	Asp	Leu	Ile	Arg	Lys	Lys	Met	Lys	Glu
				725					730					735	
Ala	Leu	Glu	Asn	Gln	Ala	Glu	Ala	Thr	Lys	Ala	Ile	Ile	Asn	Tyr	Gln
			740					745					750		
Tyr	Asn	Gln	Tyr	Thr	Glu	Glu	Glu	Lys	Asn	Asn	Ile	Asn	Phe	Asn	Ile
		755					760					765			
Asp	Asp	Leu	Ser	Ser	Lys	Leu	Asn	Glu	Ser	Ile	Asn	Lys	Ala	Met	Ile
	770					775					780				
Asn	Ile	Asn	Lys	Phe	Leu	Asn	Gln	Cys	Ser	Val	Ser	Tyr	Leu	Met	Asn
	785					790					795				800
Ser	Met	Ile	Pro	Tyr	Gly	Val	Lys	Arg	Leu	Glu	Asp	Phe	Asp	Ala	Ser
				805					810					815	
Leu	Lys	Asp	Ala	Leu	Leu	Lys	Tyr	Ile	Tyr	Asp	Asn	Arg	Gly	Thr	Leu
			820					825					830		
Ile	Gly	Gln	Val	Asp	Arg	Leu	Lys	Asp	Lys	Val	Asn	Asn	Thr	Leu	Ser
		835					840					845			

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Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
850 855 860

Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
865 870

&lt;210&gt; 152

&lt;211&gt; 2619

&lt;212&gt; DNA

&lt;213&gt; Clostridium botulinum

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(2619)

&lt;400&gt; 152

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Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15

gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg cag ccg 96  
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
20 25 30

gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg gaa cgt 144  
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
35 40 45

gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca ccg gaa 192  
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
50 55 60

gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg tct acc 240  
Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
65 70 75 80

gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg ttc gag 288  
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc atc gtt 336  
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa ctg aaa 384  
Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt tcc tat 432  
Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct gat atc 480  
Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac ctc acc 528  
Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg gac ttc 576  
Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

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acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca ctg ctg Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu 195 200 205	624
ggc gct ggt aaa ttc gca act gat cct gcg gtt acc ctg gct cac gaa Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu 210 215 220	672
ctg att cat gca ggc cac cgc ctg tac ggt atc gcc atc aat ccg aac Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240	720
cgt gtc ttc aaa gtt aac acc aac gcg tat tac gag atg tcc ggt ctg Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu 245 250 255	768
gaa gta agc ttc gaa gaa ctg cgt act ttt ggc ggt cac gac gct aaa Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys 260 265 270	816
ttc atc gac tct ctg caa gaa aac gag ttc cgt ctg tac tac tat aac Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn 275 280 285	864
aag ttc aaa gat atc gca tcc acc ctg aac aaa gcg aaa tcc atc gtg Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val 290 295 300	912
ggt acc act gct tct ctg cag tac atg aag aac gtt ttt aaa gaa aaa Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys 305 310 315 320	960
tac ctg ctc agc gaa gac acc tcc ggc aaa ttc tct gta gac aag ttg Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu 325 330 335	1008
aaa ttc gat aaa ctt tac aaa atg ctg act gaa att tac acc gaa gac Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp 340 345 350	1056
aac ttc gtt aag ttc ttt aaa gtt ctg aac cgc aaa acc tat ctg aac Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365	1104
ttc gac aag gca gta ttc aaa atc aac atc gtg ccg aaa gtt aac tac Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380	1152
act atc tac gat ggt ttc aac ctg cgt aac acc aac ctg gct gct aat Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400	1200
ttt aac ggc cag aac acg gaa atc aac aac atg aac ttc aca aaa ctg Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415	1248
aaa aac ttc act ggt ctg ttc gag ttt tac aag ctg ctg tgc gta cgt Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430	1296
ggc atc att acc tcc aaa act aaa tct ctg gac aaa ggt tat aac aaa Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445	1344
gcg ctg aac gac ctc tgt atc aag gtt aac aac tgg gat tta ttc ttc Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe 450 455 460	1392

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450	455	460	
agc ccg agt gaa gac aac ttc acc aac gac ctg aac aaa ggt gaa gaa Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu 465 470 475 480			1440
atc acc tca gat act aac atc gaa gca gcc gaa gaa aac atc tct ctg Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu 485 490 495			1488
gac ctg atc cag cag tac tac ctg acc ttt aat ttc gac aac gag ccg Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro 500 505 510			1536
gaa aac att tct atc gaa aac ctg agc tct gat atc atc ggc cag ctg Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu 515 520 525			1584
gaa ctg atg ccg aac atc gaa cgt ttc cca aac ggt aaa aag tac gag Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu 530 535 540			1632
ctg gac aaa tat acc atg ttc cac tac ctg cgc gcg cag gaa ttt gaa Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu 545 550 555 560			1680
cac ggc aaa tcc cgt atc gca ctg act aac tcc gtt aac gaa gct ctg His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu 565 570 575			1728
ctc aac ccg tcc cgt gta tac acc ttc ttc tct agc gac tac gtg aaa Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys 580 585 590			1776
aag gtc aac aaa gcg act gaa gct gca atg ttc ttg ggt tgg gtt gaa Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu 595 600 605			1824
cag ctt gtt tat gat ttt acc gac gag acg tcc gaa gta tct act acc Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr 610 615 620			1872
gac aaa att gcg gat atc act atc atc atc ccg tac atc ggt ccg gct Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala 625 630 635 640			1920
ctg aac att ggc aac atg ctg tac aaa gac gac ttc gtt ggt gca ctg Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu 645 650 655			1968
atc ttc tcc ggt gcg gtg atc ctg ctg gag ttc atc ccg gaa atc gcc Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala 660 665 670			2016
atc ccg gta ctg ggc acc ttt gct ctg gtt tct tac att gca aac aag Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys 675 680 685			2064
gtt ctg act gta caa acc atc gac aac gcg ctg agc aaa cgt aac gaa Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu 690 695 700			2112
aaa tgg gat gaa gtt tac aaa tat atc gtg acc aac tgg ctg gct aag Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys 705 710 715 720			2160

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gtt aat act cag atc gac ctc atc cgc aaa aaa atg aaa gaa gca ctg 2208  
Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
725 730 735

gaa aac cag gcg gaa gct acc aag gca atc att aac tac cag tac aac 2256  
Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
740 745 750

cag tac acc gag gaa gaa aaa aac aac atc aac ttc aac atc gac gat 2304  
Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
755 760 765

ctg tcc tct aaa ctg aac gaa tcc atc aac aaa gct atg atc aac atc 2352  
Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
770 775 780

aac aag ttc ctg aac cag tgc tct gta agc tat ctg atg aac tcc atg 2400  
Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
785 790 795 800

atc ccg tac ggt gtt aaa cgt ctg gag gac ttc gat gcg tct ctg aac 2443  
Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
805 810 815

gac gcc ctg ctg aaa tac att tac gac aac cgt ggc act ctg atc ggt 2496  
Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
820 825 830

cag gtt gat cgt ctg aag gac aaa gtg aac aat acc tta tcg acc gac 2544  
Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
835 840 845

atc cct ttt cag ctc agt aaa tat gtc gat aac caa cgc ctt ttg agc 2592  
Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
850 855 860

acg ttc aca gag tac atc aag taa tga 2619  
Thr Phe Thr Glu Tyr Ile Lys  
865 870

&lt;210&gt; 153

&lt;211&gt; 871

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 153

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
35 40 45

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
50 55 60

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
65 70 75 80

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Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
85 90 95

Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp

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340	345	350
Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365		
Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380		
Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400		
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415		
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430		
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445		
Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe 450 455 460		
Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu 465 470 475 480		
Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu 485 490 495		
Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro 500 505 510		
Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu 515 520 525		
Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu 530 535 540		
Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu 545 550 555 560		
His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu 565 570 575		
Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys 580 585 590		
Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu 595 600 605		



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Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala  
 625 630 635 640

Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu  
 645 650 655

Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
 660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
 675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
 690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
 705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
 725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
 740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
 755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
 770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
 785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
 805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
 820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
 835 840 845

Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
 850 855 860

Thr Phe Thr Glu Tyr Ile Lys  
 865 870

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<210> 154  
 <211> 2613  
 <212> DNA  
 <213> Clostridium botulinum

<220>  
 <221> CDS  
 <222> (1)..(2613)

<400> 154  
 atg gag ttc gtg aac aag cag ttc aac tat aag gac cct gta aac ggt 48  
 Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
 1 5 10 15  
 gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg cag ccg 96  
 Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30  
 gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg gaa cgc 144 -  
 Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45  
 gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg ccg gaa 192  
 Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
 50 55 60  
 gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg agc aca 240  
 Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
 65 70 75 80  
 gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta ttc gag 288  
 Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
 85 90 95  
 cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca atc gtc 336  
 Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110  
 cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag ttg aag 384  
 Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125  
 gtt att gac act aac tgc att aac gtg atc caa cca gac ggt agc tac 432  
 Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140  
 aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg gac att 480  
 Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160  
 atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac ctg acg 528  
 Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175  
 cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca gac ttc 576  
 Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190  
 acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg ctg ttg 624  
 Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205  
 ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca cac gag 672  
 Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu

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210	215	220	
ctc atc tac gcc ggt cat cgt ctg tat ggc att gcg att aac ccg aac Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn 225 230 235 240			720
cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt ggt tta Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu 245 250 255			768
gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat gcg aag Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys 260 265 270			816
ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac tac aac Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn 275 280 285			864
aag ttt aaa gat att gca agt aca ctg aac aag gct aag tcc att gtg Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val 290 295 300			912
ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa gag aaa Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys 305 310 315 320			960
tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat aaa tta Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu 325 330 335			1008
aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca gag gat Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp 340 345 350			1056
aat ttt gtt aag ttt ttt aaa gta ctt aac aga aaa aca tat ttg aat Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn 355 360 365			1104
ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta aat tac Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr 370 375 380			1152
aca ata tat gat gga ttt aat tta aga aat aca aat tta gca gca aac Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn 385 390 395 400			1200
ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act aaa cta Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu 405 410 415			1248
aaa aat ttt act gga ttg ttt gaa ttt tat aag ttg cta tgt gta aga Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg 420 425 430			1296
ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac aat aag Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys 435 440 445			1344
gca tta aat gat tta tgt atc aaa gtt aat aat tgg gac ttg ttt ttt Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe 450 455 460			1392
agt cct tca gaa gat aat ttt act aat gat cta aat aaa gga gaa gaa Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu 465 470 475 480			1440

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att aca tct gat act aat ata gaa gca gca gaa gaa aat att agt tta Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu	1488
485 490 495	
gat tta ata caa caa tat tat tta acc ttt aat ttt gat aat gaa cct Asp Leu Ile Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro	1536
500 505 510	
gaa aat att tca ata gaa aat ctt tca agt gac att ata ggc caa tta Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu	1584
515 520 525	
gaa ctt atg cct aat ata gaa aga ttt cct aat gga aaa aag tat gag Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu	1632
530 535 540	
tta gat aaa tat act atg ttc cat tat ctt cgt gct caa gaa ttt gaa Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu	1680
545 550 555 560	
cat ggt aaa tct agg att gct tta aca aat tct gtt aac gaa gca tta His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu	1728
565 570 575	
tta aat cct agt cgt gtt tat aca ttt ttt tct tca gac tat gta aag Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys	1776
580 585 590	
aaa gtt aat aaa gct acg gag gca gct atg ttt tta ggc tgg gta gaa Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu	1824
595 600 605	
caa tta gta tat gat ttt acc gat gaa act agc gaa gta agt act acg Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr	1872
610 615 620	
gat aaa att gcg gat ata act ata att att cca tat ata gga cct gct Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala	1920
625 630 635 640	
tta aat ata ggt aat atg tta tat aaa gat gat ttt gta ggt gct tta Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu	1968
645 650 655	
ata ttt tca gga gct gtt att ctg tta gaa ttt ata cca gag att gca Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala	2016
660 665 670	
ata cct gta tta ggt act ttt gca ctt gta tca tat att gcg aat aag Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys	2064
675 680 685	
gtt cta acc gtt caa aca ata gat aat gct tta agt aaa aga aat gaa Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu	2112
690 695 700	
aaa tgg gat gag gtc tat aaa tat ata gta aca aat tgg tta gca aag Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys	2160
705 710 715 720	
gtt aat aca cag att gat cta ata aga aaa aaa atg aaa gaa gct tta Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu	2208
725 730 735	
gaa aat caa gca gaa gca aca aag gct ata ata aac tat cag tat aat Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn	2256

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740					745					750					
caa tat act gag gaa gag aaa aat aat att aat ttt aat att gat gat														2304	
Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp															
755							760				765				
tta agt tcg aaa ctt aat gag tct ata aat aaa gct atg att aat ata														2352	
Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile															
770						775					780				
aat aaa ttt ttg aat caa tgc tct gtt tca tat tta atg aat tct atg														2400	
Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met															
785					790				795				800		
atc cct tat ggt gtt aaa cgg tta gaa gat ttt gat gct agt ctt aaa														2448	
Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys															
			805					810					815		
gat gca tta tta aag tat ata tat gat aat aga gga act tta att ggt														2496	
Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly															
			820					825					830		
caa gta gat aga tta aaa gat aaa gtt aat aat aca ctt agt aca gat														2544	
Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp															
			835				840						845		
ata cct ttt cag ctt tcc aaa tac gta gat aat caa aga tta tta tct														2592	
Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser															
			850			855					860				
aca ttt act gaa tat att aag														2613	
Thr Phe Thr Glu Tyr Ile Lys															
865					870										

&lt;210&gt; 155

&lt;211&gt; 871

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 155

Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly														
1				5					10				15	

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro														
			20					25				30		

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg														
		35				40				45				

Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu														
	50					55				60				

Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr														
65					70				75				80	

Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu														
				85				90					95	

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Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
 100 105 110

Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
 115 120 125

Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

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Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
 385 390 395 400

Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
 405 410 415

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
 420 425 430

Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys  
 435 440 445

Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe  
 450 455 460

Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu  
 465 470 475 480

Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu  
 485 490 495

Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro  
 500 505 510

Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu  
 515 520 525

Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu  
 530 535 540

Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu  
 545 550 555 560

His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu  
 565 570 575

Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys  
 580 585 590

Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu  
 595 600 605

Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr  
 610 615 620

Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala

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625		630		635		640
Leu Asn Ile Gly	Asn Met Leu Tyr Lys	Asp Asp Phe Val Gly	Ala Leu			
	645		650			655
Ile Phe Ser Gly	Ala Val Ile Leu Leu Glu	Phe Ile Pro Glu	Ile Ala			
	660		665			670
Ile Pro Val Leu	Gly Thr Phe Ala Leu Val	Ser Tyr Ile Ala	Asn Lys			
	675		680			685
Val Leu Thr Val	Gln Thr Ile Asp Asn Ala	Leu Ser Lys Arg	Asn Glu			
	690		695			700
Lys Trp Asp Glu	Val Tyr Lys Tyr Ile Val	Thr Asn Trp Leu	Ala Lys			
	705		710			715
Val Asn Thr Gln	Ile Asp Leu Ile Arg Lys	Lys Met Lys Glu	Ala Leu			
	725		730			735
Glu Asn Gln Ala	Glu Ala Thr Lys Ala Ile	Ile Asn Tyr Gln	Tyr Asn			
	740		745			750
Gln Tyr Thr Glu	Glu Glu Lys Asn Asn Ile	Asn Phe Asn Ile	Asp Asp			
	755		760			765
Leu Ser Ser Lys	Leu Asn Glu Ser Ile Asn	Lys Ala Met Ile	Asn Ile			
	770		775			780
Asn Lys Phe Leu	Asn Gln Cys Ser Val Ser	Tyr Leu Met Asn	Ser Met			
	785		790			795
Ile Pro Tyr Gly	Val Lys Arg Leu Glu Asp	Phe Asp Ala Ser	Leu Lys			
	805		810			815
Asp Ala Leu Leu	Lys Tyr Ile Tyr Asp	Asn Arg Gly Thr	Leu Ile Gly			
	820		825			830
Gln Val Asp Arg	Leu Lys Asp Lys Val	Asn Asn Thr Leu	Ser Thr Asp			
	835		840			845
Ile Pro Phe Gln	Leu Ser Lys Tyr Val Asp	Asn Gln Arg Leu	Leu Ser			
	850		855			860
Thr Phe Thr Glu	Tyr Ile Lys					
	865		870			

<210> 156  
 <211> 2637  
 <212> DNA



&lt;213&gt; Clostridium botulinum

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1) .. (2637)

&lt;400&gt; 156

gga tcc atg gag ttc gtt aac aaa cag ttc aac tat aaa gac cca gtt	48
Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val	
1 5 10 15	
aac ggt gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg	96
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met	
20 25 30	
cag ccg gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg	144
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro	
35 40 45	
gaa cgt gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca	192
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro	
50 55 60	
ccg gaa gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg	240
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu	
65 70 75 80	
tct acc gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg	288
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu	
85 90 95	
ttc gag cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc	336
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser	
100 105 110	
atc gtt cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa	384
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu	
115 120 125	
ctg aaa gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt	432
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly	
130 135 140	
tcc tat cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct	480
Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala	
145 150 155 160	
gat atc atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac	528
Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn	
165 170 175	
ctc acc cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg	576
Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro	
180 185 190	
gac ttc acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca	624
Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro	
195 200 205	
ctg ctg ggc gct ggt aaa ttc gca act gat cct gcg gtt acc ctg gct	672
Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala	
210 215 220	
cac gaa ctg att cat gca ggc cac cgc ctg tac ggt atc gcc atc aat	720
His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn	



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gaa gaa aac atc tcg ctg gac ctg atc cag cag tac tac ctg acc ttt	1536
Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe	
500 505 510	
aat ttc gac aac gag ccg gaa aac att tct atc gaa aac ctg agc tct	1584
Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser	
515 520 525	
gat atc atc ggc cag ctg gaa ctg atg ccg aac atc gaa cgt ttc cca	1632
Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro	
530 535 540	
aac ggt aaa aag tac gag ctg gac aaa tat acc atg ttc cac tac ctg	1680
Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu	
545 550 555 560	
cgc gcg cag gaa ttt gaa cac ggc aaa tcc cgt atc gca ctg act aac	1728
Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn	
565 570 575	
tcc gtt aac gaa gct ctg ctc aac ccg tcc cgt gta tac acc ttc ttc	1776
Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe	
580 585 590	
tct agc gac tac gtg aaa aag gtc aac aaa gcg act gaa gct gca atg	1824
Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met	
595 600 605	
ttc ttg ggt tgg gtt gaa cag ctt gtt tat gat ttt acc gac gag acg	1872
Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr	
610 615 620	
tcc gaa gta tct act acc gac aaa att gcg gat atc act atc atc atc	1920
Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile	
625 630 635 640	
ccg tac atc ggt ccg gct ctg aac att ggc aac atg ctg tac aaa gac	1968
Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp	
645 650 655	
gac ttc gtt ggt gca ctg atc ttc tcc ggt gcg gtg atc ctg ctg gag	2016
Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu	
660 665 670	
ttc atc ccg gaa atc gcc atc ccg gta ctg ggc acc ttt gct ctg gtt	2064
Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val	
675 680 685	
tct tac att gca aac aag gtt ctg act gta caa acc atc gac aac gcg	2112
Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala	
690 695 700	
ctg agc aaa cgt aac gaa aaa tgg gat gaa gtt tac aaa tat atc gtg	2160
Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val	
705 710 715 720	
acc aac tgg ctg gct aag gtt aat act cag atc gac ctc atc cgc aaa	2208
Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys	
725 730 735	
aaa atg aaa gaa gca ctg gaa aac cag gcg gaa gct acc aag gca atc	2256
Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile	
740 745 750	
att aac tac cag tac aac cag tac acc gag gaa gaa aaa aac aac atc	2304
Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile	

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755	760	765	
aac ttc aac atc gac gat ctg tcc tct aaa ctg aac gaa tcc atc aac			2352
Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn			
770	775	780	
aaa gct atg atc aac atc aac aag ttc ctg aac cag tgc tct gta agc			2400
Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser			
785	790	795	800
tat ctg atg aac tcc atg atc ccg tac ggt gtt aaa cgt ctg gag gac			2448
Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp			
	805	810	815
ttc gat gcg tct ctg aaa gac gcc ctg ctg aaa tac att tac gac aac			2496
Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn			
	820	825	830
cgt ggc act ctg atc ggt cag gtt gat cgt ctg aag gac aaa gtg aac			2544
Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn			
	835	840	845
aat acc tta tcg acc gac atc cct ttt cag ctc agt aaa tat gtc gat			2592
Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp			
	850	855	860
aac caa cgc ctt ttg agc acg ttc aca gag tac atc aag taa tga			2637
Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys			
865	870	875	

&lt;210&gt; 157

&lt;211&gt; 877

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 157

Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val  
1 5 10 15

Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20 25 30

Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
35 40 45

Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
50 55 60

Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
65 70 75 80

Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
85 90 95

Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
100 105 110

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Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
 115 120 125

Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
 130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Gln Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320

Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
 355 360 365

Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

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Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
 405 410 415

Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
 420 425 430

Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ile Glu Gly Arg Ala Leu Asn Asp Leu Cys Ile Lys Val Asn  
 450 455 460

Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp  
 465 470 475 480

Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala  
 485 490 495

Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe  
 500 505 510

Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser  
 515 520 525

Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro  
 530 535 540

Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu  
 545 550 555 560

Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn  
 565 570 575

Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe  
 580 585 590

Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met  
 595 600 605

Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr  
 610 615 620

Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile  
 625 630 635 640

Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp

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645	650	655
Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu 660 665 670		
Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val 675 680 685		
Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala 690 695 700		
Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val 705 710 715 720		
Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys 725 730 735		
Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile 740 745 750		
Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile 755 760 765		
Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn 770 775 780		
Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser 785 790 795 800		
Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp 805 810 815		
Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn 820 825 830		
Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn 835 840 845		
Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp 850 855 860		
Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys 865 870 875		

<210> 158  
 <211> 2643  
 <212> DNA  
 <213> Clostridium botulinum

<220>

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&lt;221&gt; CDS

&lt;222&gt; (1)..(2643)

&lt;400&gt; 158

atg gag ttc gtt aac aaa cag ttc aac tat aaa gac cca gtt aac ggt	48
Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly	
1 5 10 15	
ggt gac att gct tac atc aaa atc ccg aac gct ggc cag atg cag ccg	96
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro	
20 25 30	
gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg gaa cgt	144
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg	
35 40 45	
gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca ccg gaa	192
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu	
50 55 60	
gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg tct acc	240
Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr	
65 70 75 80	
gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg ttc gag	288
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu	
85 90 95	
cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc atc gtt	336
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val	
100 105 110	
cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa ctg aaa	384
Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys	
115 120 125	
gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt tcc tat	432
Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr	
130 135 140	
cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct gat atc	480
Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile	
145 150 155 160	
atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac ctc acc	528
Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr	
165 170 175	
cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg gac ttc	576
Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe	
180 185 190	
acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca ctg ctg	624
Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu	
195 200 205	
ggc gct ggt aaa ttc gca act gat cct gcg gtt acc ctg gct cac gaa	672
Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu	
210 215 220	
ctg att cat gca ggc cac cgc ctg tac ggt atc gcc atc aat ccg aac	720
Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn	
225 230 235 240	
cgt gtc ttc aaa gtt aac acc aac gcg tat tac gag atg tcc ggt ctg	768
Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu	





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gaa aac att tct atc gaa aac ctg agc tct gat atc atc ggc cag ctg Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu	1584
515 520 525	
gaa ctg atg ccg aac atc gaa cgt ttc cca aac ggt aaa aag tac gag Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu	1632
530 535 540	
ctg gac aaa tat acc atg ttc cac tac ctg cgc gcg cag gaa ttt gaa Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu	1680
545 550 555 560	
cac ggc aaa tcc cgt atc gca ctg act aac tcc gtt aac gaa gct ctg His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu	1728
565 570 575	
ctc aac ccg tcc cgt gta tac acc ttc ttc tct agc gac tac gtg aaa Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys	1776
580 585 590	
aag gtc aac aaa gcg act gaa gct gca atg ttc ttg ggt tgg gtt gaa Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu	1824
595 600 605	
cag ctt gtt tat gat ttt acc gac gag acg tcc gaa gta tct act acc Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr	1872
610 615 620	
gac aaa att gcg gat atc act atc atc atc ccg tac atc ggt ccg gct Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala	1920
625 630 635 640	
ctg aac att ggc aac atg ctg tac aaa gac gac ttc gtt ggt gca ctg Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu	1968
645 650 655	
atc ttc tcc ggt gcg gtg atc ctg ctg gag ttc atc ccg gaa atc gcc Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala	2016
660 665 670	
atc ccg gta ctg ggc acc ttt gct ctg gtt tct tac att gca aac aag Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys	2064
675 680 685	
gtt ctg act gta caa acc atc gac aac gcg ctg agc aaa cgt aac gaa Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu	2112
690 695 700	
aaa tgg gat gaa gtt tac aaa tat atc gtg acc aac tgg ctg gct aag Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys	2160
705 710 715 720	
gtt aat act cag atc gac ctc atc cgc aaa aaa atg aaa gaa gca ctg Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu	2208
725 730 735	
gaa aac cag gcg gaa gct acc aag gca atc att aac tac cag tac aac Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn	2256
740 745 750	
cag tac acc gag gaa gaa aaa aac aac atc aac ttc aac atc gac gat Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp	2304
755 760 765	
ctg tcc tct aaa ctg aac gaa tcc atc aac aaa gct atg atc aac atc Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile	2352

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770	775	780	
aac aag ttc ctg aac cag tgc tct gta agc tat ctg atg aac tcc atg			2400
Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met			
785	790	795	800
atc ccg tac ggt gtt aaa cgt ctg gag gac ttc gat gcg tct ctg aaa			2448
Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys			
	805	810	815
gac gcc ctg ctg aaa tac att tac gac aac cgt ggc act ctg atc ggt			2496
Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly			
	820	825	830
cag gtt gat cgt ctg aag gac aaa gtg aac aat acc tta tcg acc gac			2544
Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp			
	835	840	845
atc cct ttt cag ctc agt aaa tat gtc gat aac caa cgc ctt ttg agc			2592
Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser			
	850	855	860
acg ttc aca gag tac atc aag ctc gag cac cac cac cac cac taa			2640
Thr Phe Thr Glu Tyr Ile Lys Leu Glu His His His His His His			
	865	870	875
tga			2643
<210>	159		
<211>	879		
<212>	PRT		
<213>	Clostridium botulinum		
<400>	159		
Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly			
1	5	10	15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro			
	20	25	30
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg			
	35	40	45
Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu			
	50	55	60
Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr			
	65	70	75
Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu			
	85	90	95
Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val			
	100	105	110
Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys			
	115	120	125

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Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
 130 135 140

Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
 145 150 155 160

Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
 165 170 175

Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
 180 185 190

Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
 195 200 205

Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
 210 215 220

Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
 225 230 235 240

Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
 245 250 255

Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
 260 265 270

Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
 275 280 285

Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
 290 295 300

Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
 305 310 315 320

Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
 325 330 335

Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
 340 345 350

Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
 355 360 365

Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
 370 375 380

Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn

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385		390		395		400
Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu		405		410		415
Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg		420		425		430
Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn Lys		435		440		445
Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu Phe Phe		450		455		460
Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly Glu Glu		465		470		475
Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile Ser Leu		485		490		495
Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn Glu Pro		500		505		510
Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly Gln Leu		515		520		525
Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys Tyr Glu		530		535		540
Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu Phe Glu		545		550		555
His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu Ala Leu		565		570		575
Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr Val Lys		580		585		590
Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp Val Glu		595		600		605
Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser Thr Thr		610		615		620
Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly Pro Ala		625		630		635
Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu		645		650		655

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Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala  
660 665 670

Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys  
675 680 685

Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu  
690 695 700

Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys  
705 710 715 720

Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu  
725 730 735

Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn  
740 745 750

Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp  
755 760 765

Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile  
770 775 780

Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met  
785 790 795 800

Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys  
805 810 815

Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly  
820 825 830

Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp  
835 840 845

Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser  
850 855 860

Thr Phe Thr Glu Tyr Ile Lys Leu Glu His His His His His His  
865 870 875

<210> 160  
<211> 2667  
<212> DNA  
<213> Clostridium botulinum

<220>  
<221> CDS  
<222> (1)..(2667)

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Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val																		
1				5					10					15				
aac ggt gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg																		96
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met																		
			20					25					30					
cag ccg gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg																		144
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro																		
			35					40					45					
gaa cgt gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca																		192
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro																		
			50				55					60						
ccg gaa gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg																		240
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu																		
65					70						75						80	
tct acc gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg																		288
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu																		
				85					90								95	
ttc gag cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc																		336
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser																		
			100					105						110				
atc gtt cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa																		384
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu																		
			115					120					125					
ctg aaa gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt																		432
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly																		
			130				135					140						
tcc tat cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct																		480
Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala																		
145					150					155							160	
gat atc atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac																		528
Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn																		
				165					170								175	
ctc acc cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg																		576
Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro																		
			180					185						190				
gac ttc acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca																		624
Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro																		
			195					200										

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Gly	Leu	Glu	Val	Ser	Phe	Glu	Glu	Leu	Arg	Thr	Phe	Gly	Gly	His	Asp	
			260					265					270			
gct	aaa	ttc	atc	gac	tct	ctg	caa	gaa	aac	gag	ttc	cgt	ctg	tac	tac	864
Ala	Lys	Phe	Ile	Asp	Ser	Leu	Gln	Glu	Asn	Glu	Phe	Arg	Leu	Tyr	Tyr	
		275					280					285				
tat	aac	aag	ttc	aaa	gat	atc	gca	tcc	acc	ctg	aac	aaa	gcg	aaa	tcc	912
Tyr	Asn	Lys	Phe	Lys	Asp	Ile	Ala	Ser	Thr	Leu	Asn	Lys	Ala	Lys	Ser	
	290					295					300					
atc	gtg	ggg	acc	act	gct	tct	ctg	cag	tac	atg	aag	aac	gtt	ttt	aaa	960
Ile	Val	Gly	Thr	Thr	Ala	Ser	Leu	Gln	Tyr	Met	Lys	Asn	Val	Phe	Lys	
305					310					315					320	
gaa	aaa	tac	ctg	ctc	agc	gaa	gac	acc	tcc	ggc	aaa	ttc	tct	gta	gac	1008
Glu	Lys	Tyr	Leu	Leu	Ser	Glu	Asp	Thr	Ser	Gly	Lys	Phe	Ser	Val	Asp	
				325					330					335		
aag	ttg	aaa	ttc	gat	aaa	ctt	tac	aaa	atg	ctg	act	gaa	att	tac	acc	1056
Lys	Leu	Lys	Phe	Asp	Lys	Leu	Tyr	Lys	Met	Leu	Thr	Glu	Ile	Tyr	Thr	
			340					345					350			
gaa	gac	aac	ttc	gtt	aag	ttc	ttt	aaa	gtt	ctg	aac	cgc	aaa	acc	tat	1104
Glu	Asp	Asn	Phe	Val	Lys	Phe	Phe	Lys	Val	Leu	Asn	Arg	Lys	Thr	Tyr	
		355					360					365				
ctg	aac	ttc	gac	aag	gca	gta	ttc	aaa	atc	aac	atc	gtg	ccg	aaa	gtt	1152
Leu	Asn	Phe	Asp	Lys	Ala	Val	Phe	Lys	Ile	Asn	Ile	Val	Pro	Lys	Val	
	370					375					380					
aac	tac	act	atc	tac	gat	ggg	ttc	aac	ctg	cgt	aac	acc	aac	ctg	gct	1200
Asn	Tyr	Thr	Ile	Tyr	Asp	Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	
385					390					395					400	
gct	aat	ttt	aac	ggc	cag	aac	acg	gaa	atc	aac	aac	atg	aac	ttc	aca	1248
Ala	Asn	Phe	Asn	Gly	Gln	Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	
			405					410						415		
aaa	ctg	aaa	aac	ttc	act	ggg	ctg	ttc	gag	ttt	tac	aag	ctg	ctg	tgc	1296
Lys	Leu	Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu	Phe	Tyr	Lys	Leu	Leu	Cys	
			420				425						430			
gta	cgt	ggc	atc	att	acc	tcc	aaa	act	aaa	tct	ctg	gac	aaa	ggg	tat	1344
Val	Arg	Gly	Ile	Ile	Thr	Ser	Lys	Thr	Lys	Ser	Leu	Asp	Lys	Gly	Tyr	
		435					440					445				
aac	aaa	gca	tcg	aag	gtc	gtg	ctg	aac	gac	ctc	tgt	atc	aag	gtt	aac	1392
Asn	Lys	Ala	Ser	Lys	Val	Val	Leu	Asn	Asp	Leu	Cys	Ile	Lys	Val	Asn	
	450					455					460					
aac	tgg	gat	tta	ttc	ttc	agc	ccg	agt	gaa	gac	aac	ttc	acc	aac	gac	1440
Asn	Trp	Asp	Leu	Phe	Phe	Ser	Pro	Ser	Glu	Asp	Asn	Phe	Thr	Asn	Asp	
465					470					475					480	
ctg	aac	aaa	ggg	gaa	gaa	atc	acc	tca	gat	act	aac	atc	gaa	gca	gcc	1488
Leu	Asn	Lys	Gly	Glu	Glu	Ile	Thr	Ser	Asp	Thr	Asn	Ile	Glu	Ala	Ala	
			485						490					495		
gaa	gaa	aac	atc	tcg	ctg	gac	ctg	atc	cag	cag	tac	tac	ctg	acc	ttt	1536
Glu	Glu	Asn	Ile	Ser	Leu	Asp	Leu	Ile	Gln	Gln	Tyr	Tyr	Leu	Thr	Phe	
			500					505					510			
aat	ttc	gac	aac	gag	ccg	gaa	aac	att	tct	atc	gaa	aac	ctg	agc	tct	1584
Asn	Phe	Asp	Asn	Glu	Pro	Glu	Asn	Ile	Ser	Ile	Glu	Asn	Leu	Ser	Ser	
		515					520					525				



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gat atc atc ggc cag ctg gaa ctg atg ccg aac atc gaa cgt ttc cca Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro 530 535 540	1632
aac ggt aaa aag tac gag ctg gac aaa tat acc atg ttc cac tac ctg Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu 545 550 555 560	1680
cgc gcg cag gaa ttt gaa cac ggc aaa tcc cgt atc gca ctg act aac Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn 565 570 575	1728
tcc gtt aac gaa gct ctg ctc aac ccg tcc cgt gta tac acc ttc ttc Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe 580 585 590	1776
tct agc gac tac gtg aaa aag gtc aac aaa gcg act gaa gct gca atg Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met 595 600 605	1824
ttc ttg ggt tgg gtt gaa cag ctt gtt tat gat ttt acc gac gag acg Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr 610 615 620	1872
tcc gaa gta tct act acc gac aaa att gcg gat atc act atc atc atc Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile 625 630 635 640	1920
ccg tac atc ggt ccg gct ctg aac att ggc aac atg ctg tac aaa gac Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp 645 650 655	1968
gac ttc gtt ggt gca ctg atc ttc tcc ggt gcg gtg atc ctg ctg gag Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu 660 665 670	2016
ttc atc ccg gaa atc gcc atc ccg gta ctg ggc acc ttt gct ctg gtt Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val 675 680 685	2064
tct tac att gca aac aag gtt ctg act gta caa acc atc gac aac gcg Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala 690 695 700	2112
ctg agc aaa cgt aac gaa aaa tgg gat gaa gtt tac aaa tat atc gtg Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val 705 710 715 720	2160
acc aac tgg ctg gct aag gtt aat act cag atc gac ctc atc cgc aaa Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys 725 730 735	2208
aaa atg aaa gaa gca ctg gaa aac cag gcg gaa gct acc aag gca atc Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile 740 745 750	2256
att aac tac cag tac aac cag tac acc gag gaa gaa aaa aac aac atc Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile 755 760 765	2304
aac ttc aac atc gac gat ctg tcc tct aaa ctg aac gaa tcc atc aac Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn 770 775 780	2352
aaa gct atg atc aac atc aac aag ttc ctg aac cag tgc tct gta agc Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser 2400	2400

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785	790	795	800	
tat ctg atg aac tcc atg atc ccg tac ggt gtt aaa cgt ctg gag gac				2448
Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp	805	810	815	
ttc gat gcg tct ctg aaa gac gcc ctg ctg aaa tac att tac gac aac				2496
Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn	820	825	830	
cgt ggc act ctg atc ggt cag gtt gat cgt ctg aag gac aaa gtg aac				2544
Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn	835	840	845	
aat acc tta tcg acc gac atc cct ttt cag ctc agt aaa tat gtc gat				2592
Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp	850	855	860	
aac caa cgc ctt ttg agc acg ttc aca gag tac atc aag atc gaa ggt				2640
Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr Ile Lys Ile Glu Gly	865	870	875 880	
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Arg His His His His His His	885			

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 <212> PRT  
 <213> Clostridium botulinum

<400> 161

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Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro	35	40	45	
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro	50	55	60	
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu	65	70	75	80
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu	85	90	95	
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser	100	105	110	
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu	115	120	125	

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Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
 130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320

Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
 355 360 365

Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

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Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
 405 410 415

Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
 420 425 430

Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ala Ser Lys Val Val Leu Asn Asp Leu Cys Ile Lys Val Asn  
 450 455 460

Asn Trp Asp Leu Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp  
 465 470 475 480

Leu Asn Lys Gly Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala  
 485 490 495

Glu Glu Asn Ile Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe  
 500 505 510

Asn Phe Asp Asn Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser  
 515 520 525

Asp Ile Ile Gly Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro  
 530 535 540

Asn Gly Lys Lys Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu  
 545 550 555 560

Arg Ala Gln Glu Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn  
 565 570 575

Ser Val Asn Glu Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe  
 580 585 590

Ser Ser Asp Tyr Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met  
 595 600 605

Phe Leu Gly Trp Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr  
 610 615 620

Ser Glu Val Ser Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile  
 625 630 635 640

Pro Tyr Ile Gly Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp  
 645 650 655

Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu

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660	665	670
Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val 675 680 685		
Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala 690 695 700		
Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val 705 710 715 720		
Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys 725 730 735		
Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile 740 745 750		
Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile 755 760 765		
Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn 770 775 780		
Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser 785 790 795 800		
Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp 805 810 815		
Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn 820 825 830		
Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn 835 840 845		
Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp 850 855 860		
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Arg His His His His His His 885		

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<220>

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aac ggt gtt gac att gcc tac atc aaa att cca aac gcc ggc cag atg	96
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met	
20 25 30	
cag ccg gtg aag gct ttc aag att cat aac aaa atc tgg gtt att ccg	144
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro	
35 40 45	
gaa cgc gat aca ttt acg aac ccg gaa gaa gga gac ttg aac ccg ccg	192
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro	
50 55 60	
ccg gaa gca aag cag gtg cca gtt tca tac tac gat tca acc tat ctg	240
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu	
65 70 75 80	
agc aca gac aac gag aag gat aac tac ctg aag gga gtg acc aaa tta	288
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu	
85 90 95	
ttc gag cgt att tat tcc act gac ctg ggc cgt atg ctg ctg acc tca	336
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser	
100 105 110	
atc gtc cgc gga atc cca ttt tgg ggt ggc agt acc att gac acg gag	384
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu	
115 120 125	
ttg aag gtt att gac act aac tgc att aac gtg atc caa cca gac ggt	432
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly	
130 135 140	
agc tac aga tct gaa gaa ctt aac ctc gta atc atc ggg ccc tcc gcg	480
Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala	
145 150 155 160	
gac att atc cag ttt gag tgc aag agc ttt ggc cac gaa gtg ttg aac	528
Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn	
165 170 175	
ctg acg cgt aac ggt tac ggc tct act cag tac att cgt ttc agc cca	576
Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro	
180 185 190	
gac ttc acg ttc ggt ttc gag gag agc ctg gag gtt gat acc aac ccg	624
Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro	
195 200 205	
ctg ttg ggt gca ggc aag ttc gca act gat cca gcg gtg acc ctg gca	672
Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala	
210 215 220	
cac gag ctc atc tac gcc ggt cat cgt ctg tat ggc att gcg att aac	720
His Glu Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn	
225 230 235 240	
ccg aac cgc gtg ttc aag gtt aac acc aac gcc tac tac gag atg agt	768
Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser	

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245					250					255					
ggt tta gaa gta agc ttc gag gaa ctg cgc acg ttc ggt ggc cat gat	816														
Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp															
	260					265					270				
gcg aag ttt atc gac agc ttg cag gag aac gag ttc cgt ctg tac tac	864														
Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr															
	275					280					285				
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Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser															
	290					295					300				
att gtg ggt acc act gct tca tta cag tat atg aaa aat gtt ttt aaa	960														
Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys															
	305					310					315				
gag aaa tat ctc cta tct gaa gat aca tct gga aaa ttt tcg gta gat	1008														
Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp															
	325					330					335				
aaa tta aaa ttt gat aag tta tac aaa atg tta aca gag att tac aca	1056														
Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr															
	340					345					350				
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Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr															
	355					360					365				
ttg aat ttt gat aaa gcc gta ttt aag ata aat ata gta cct aag gta	1152														
Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val															
	370					375					380				
aat tac aca ata tat gat gga ttt aat tta aga aat aca aat tta gca	1200														
Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala															
	385					390					395				
gca aac ttt aat ggt caa aat aca gaa att aat aat atg aat ttt act	1248														
Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr															
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Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys															
	420					425					430				
gta aga ggg ata ata act tct aaa act aaa tca tta gat aaa gga tac	1344														
Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr															
	435					440					445				
aat aag gca tta aat gat tta tgt atc aaa gtt aat aat tgg gac ttg	1392														
Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu															
	450					455					460				
ttt ttt agt cct tca gaa gat aat ttt act aat gat cta aat aaa gga	1440														
Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly															
	465					470					475				
gaa gaa att aca tct gat act aat ata gaa gca gca gaa gaa aat att	1488														
Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile															
	485					490					495				
agt tta gat tta ata caa caa tat tat tta acc ttt aat ttt gat aat	1536														
Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn															
	500					505					510				

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gaa cct gaa aat att tca ata gaa aat ctt tca agt gac att ata ggc Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly	1584
515 520 525	
caa tta gaa ctt atg cct aat ata gaa aga ttt cct aat gga aaa aag Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys	1632
530 535 540	
tat gag tta gat aaa tat act atg ttc cat tat ctt cgt gct caa gaa Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu	1680
545 550 555 560	
ttt gaa cat ggt aaa tct agg att gct tta aca aat tct gtt aac gaa Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu	1728
565 570 575	
gca tta tta aat cct agt cgt gtt tat aca ttt ttt tct tca gac tat Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr	1776
580 585 590	
gta aag aaa gtt aat aaa gct acg gag gca gct atg ttt tta ggc tgg Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp	1824
595 600 605	
gta gaa caa tta gta tat gat ttt acc gat gaa act agc gaa gta agt Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser	1872
610 615 620	
act acg gat aaa att gcg gat ata act ata att att cca tat ata gga Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly	1920
625 630 635 640	
cct gct tta aat ata ggt aat atg tta tat aaa gat gat ttt gta ggt Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly	1968
645 650 655	
gct tta ata ttt tca gga gct gtt att ctg tta gaa ttt ata cca gag Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu	2016
660 665 670	
att gca ata cct gta tta ggt act ttt gca ctt gta tca tat att gcg Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala	2064
675 680 685	
aat aag gtt cta acc gtt caa aca ata gat aat gct tta agt aaa aga Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg	2112
690 695 700	
aat gaa aaa tgg gat gag gtc tat aaa tat ata gta aca aat tgg tta Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu	2160
705 710 715 720	
gca aag gtt aat aca cag att gat cta ata aga aaa aaa atg aaa gaa Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu	2208
725 730 735	
gct tta gaa aat caa gca gaa gca aca aag gct ata ata aac tat cag Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln	2256
740 745 750	
tat aat caa tat act gag gaa gag aaa aat aat att aat ttt aat att Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile	2304
755 760 765	
gat gat tta agt tcg aaa ctt aat gag tct ata aat aaa gct atg att Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile	2352



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770	775	780	
aat ata aat aaa ttt ttg aat caa tgc tct gtt tca tat tta atg aat			2400
Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn			
785	790	795	800
tct atg atc cct tat ggt gtt aaa cgg tta gaa gat ttt gat gct agt			2448
Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser			
	805	810	815
ctt aaa gat gca tta tta aag tat ata tat gat aat aga gga act tta			2496
Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu			
	820	825	830
att ggt caa gta gat aga tta aaa gat aaa gtt aat aat aca ctt agt			2544
Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser			
	835	840	845
aca gat ata cct ttt cag ctt tcc aaa tac gta gat aat caa aga tta			2592
Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu			
	850	855	860
tta tct aca ttt act gaa tat att aag taa tga			2625
Leu Ser Thr Phe Thr Glu Tyr Ile Lys			
865	870		

&lt;210&gt; 163

&lt;211&gt; 873

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 163

Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val
1 5 10 15

Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
20 25 30

Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro
35 40 45

Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro
50 55 60

Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu
65 70 75 80

Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu
85 90 95

Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser
100 105 110

Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu
115 120 125

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Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
 130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320

Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
 355 360 365

Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

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Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
 405 410 415

Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
 420 425 430

Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu  
 450 455 460

Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly  
 465 470 475 480

Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile  
 485 490 495

Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn  
 500 505 510

Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly  
 515 520 525

Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys  
 530 535 540

Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu  
 545 550 555 560

Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu  
 565 570 575

Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr  
 580 585 590

Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp  
 595 600 605

Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser  
 610 615 620

Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly  
 625 630 635 640

Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly  
 645 650 655

Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu

660

665

670

Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala  
 675 680 685

Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg  
 690 695 700

Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu  
 705 710 715 720

Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu  
 725 730 735

Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln  
 740 745 750

Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile  
 755 760 765

Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile  
 770 775 780

Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn  
 785 790 795 800

Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser  
 805 810 815

Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu  
 820 825 830

Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser  
 835 840 845

Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
 850 855 860

Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
 865 870

<210> 164  
 <211> 2625  
 <212> DNA  
 <213> Clostridium botulinum

<220>  
 <221> CDS  
 <222> (1) .. (2625)

<400> 164

gga tcc atg gag ttc gtt aac aaa cag ttc aac tat aaa gac cca gtt Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val 1 5 10 15	48
aac ggt gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met 20 25 30	96
cag ccg gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro 35 40 45	144
gaa cgt gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro 50 55 60	192
ccg gaa gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu 65 70 75 80	240
tct acc gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu 85 90 95	288
ttc gag cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser 100 105 110	336
atc gtt cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu 115 120 125	384
ctg aaa gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly 130 135 140	432
tcc tat cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala 145 150 155 160	480
gat atc atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn 165 170 175	528
ctc acc cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro 180 185 190	576
gac ttc acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro 195 200 205	624
ctg ctg ggc gct ggt aaa ttc gca act gat cct gcg gtt acc ctg gct Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala 210 215 220	672
cac gaa ctg att tat gca ggc cac cgc ctg tac ggt atc gcc atc aat His Glu Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn 225 230 235 240	720
ccg aac cgt gtc ttc aaa gtt aac acc aac gcg tat tac gag atg tcc Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser 245 250 255	768
ggt ctg gaa gta agc ttc gaa gaa ctg cgt act ttt ggc ggt cac gac Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp	816

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260	265	270	
gct aaa ttc atc gac tct ctg caa gaa aac gag ttc cgt ctg tac tac Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr 275 280 285			864
tat aac aag ttc aaa gat atc gca tcc acc ctg aac aaa gcg aaa tcc Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser 290 295 300			912
atc gtg ggt acc act gct tct ctg cag tac atg aag aac gtt ttt aaa Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys 305 310 315 320			960
gaa aaa tac ctg ctc agc gaa gac acc tcc ggc aaa ttc tct gta gac Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp 325 330 335			1008
aag ttg aaa ttc gat aaa ctt tac aaa atg ctg act gaa att tac acc Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr 340 345 350			1056
gaa gac aac ttc gtt aag ttc ttt aaa gtt ctg aac cgc aaa acc tat Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr 355 360 365			1104
ctg aac ttc gac aag gca gta ttc aaa atc aac atc gtg ccg aaa gtt Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val 370 375 380			1152
aac tac act atc tac gat ggt ttc aac ctg cgt aac acc aac ctg gct Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala 385 390 395 400			1200
gct aat ttt aac ggc cag aac acg gaa atc aac aac atg aac ttc aca Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr 405 410 415			1248
aaa ctg aaa aac ttc act ggt ctg ttc gag ttt tac aag ctg ctg tgc Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys 420 425 430			1296
gta cgt ggc atc att acc tcc aaa act aaa tct ctg gac aaa ggt tat Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr 435 440 445			1344
aac aaa gcg ctg aac gac ctc tgt atc aag gtt aac aac tgg gat tta Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu 450 455 460			1392
ttc ttc agc ccg agt gaa gac aac ttc acc aac gac ctg aac aaa ggt Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly 465 470 475 480			1440
gaa gaa atc acc tca gat act aac atc gaa gca gcc gaa gaa aac atc Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile 485 490 495			1488
tcg ctg gac ctg atc cag cag tac tac ctg acc ttt aat ttc gac aac Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn 500 505 510			1536
gag ccg gaa aac att tct atc gaa aac ctg agc tct gat atc atc ggc Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly 515 520 525			1584

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cag ctg gaa ctg atg ccg aac atc gaa cgt ttc cca aac ggt aaa aag Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys 530 535 540	1632
tac gag ctg gac aaa tat acc atg ttc cac tac ctg cgc gcg cag gaa Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu 545 550 555 560	1680
ttt gaa cac ggc aaa tcc cgt atc gca ctg act aac tcc gtt aac gaa Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu 565 570 575	1728
gct ctg ctc aac ccg tcc cgt gta tac acc ttc ttc tct agc gac tac Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr 580 585 590	1776
gtg aaa aag gtc aac aaa gcg act gaa gct gca atg ttc ttg ggt tgg Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp 595 600 605	1824
gtt gaa cag ctt gtt tat gat ttt acc gac gag acg tcc gaa gta tct Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser 610 615 620	1872
act acc gac aaa att gcg gat atc act atc atc atc ccg tac atc ggt Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly 625 630 635 640	1920
ccg gct ctg aac att ggc aac atg ctg tac aaa gac gac ttc gtt ggt Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly 645 650 655	1968
gca ctg atc ttc tcc ggt gcg gtg atc ctg ctg gag ttc atc ccg gaa Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu 660 665 670	2016
atc gcc atc ccg gta ctg ggc acc ttt gct ctg gtt tct tac att gca Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala 675 680 685	2064
aac aag gtt ctg act gta caa acc atc gac aac gcg ctg agc aaa cgt Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg 690 695 700	2112
aac gaa aaa tgg gat gaa gtt tac aaa tat atc gtg acc aac tgg ctg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu 705 710 715 720	2160
gct aag gtt aat act cag atc gac ctc atc cgc aaa aaa atg aaa gaa Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu 725 730 735	2208
gca ctg gaa aac cag gcg gaa gct acc aag gca atc att aac tac cag Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln 740 745 750	2256
tac aac cag tac acc gag gaa gaa aaa aac aac atc aac ttc aac atc Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile 755 760 765	2304
gac gat ctg tcc tct aaa ctg aac gaa tcc atc aac aaa gct atg atc Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile 770 775 780	2352
aac atc aac aag ttc ctg aac cag tgc tct gta agc tat ctg atg aac Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn	2400

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785	790	795	800	
tcc atg atc ccg tac ggt gtt aaa cgt ctg gag gac ttc gat gcg tct				2448
Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser	805	810	815	
ctg aaa gac gcc ctg ctg aaa tac att tac gac aac cgt ggc act ctg				2496
Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu	820	825	830	
atc ggt cag gtt gat cgt ctg aag gac aaa gtg aac aat acc tta tcg				2544
Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser	835	840	845	
acc gac atc cct ttt cag ctc agt aaa tat gtc gat aac caa cgc ctt				2592
Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu	850	855	860	
ttg agc acg ttc aca gag tac atc aag taa tga				2625
Leu Ser Thr Phe Thr Glu Tyr Ile Lys	865	870		

<210> 165  
 <211> 873  
 <212> PRT  
 <213> Clostridium botulinum  
 <400> 165

Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val	1	5	10	15
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met	20	25	30	
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro	35	40	45	
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro	50	55	60	
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu	65	70	75	80
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu	85	90	95	
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser	100	105	110	
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu	115	120	125	
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly	130	135	140	



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Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Glu Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320

Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
 355 360 365

Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
 405 410 415

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Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
 420 425 430

Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu  
 450 455 460

Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly  
 465 470 475 480

Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile  
 485 490 495

Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn  
 500 505 510

Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly  
 515 520 525

Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys  
 530 535 540

Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu  
 545 550 555 560

Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu  
 565 570 575

Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr  
 580 585 590

Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp  
 595 600 605

Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser  
 610 615 620

Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly  
 625 630 635 640

Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly  
 645 650 655

Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu  
 660 665 670

Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala

- 455 -

675                      680                      685  
 Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg  
     690                      695                      700  
 Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu  
     705                      710                      715                      720  
 Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu  
                     725                      730                      735  
 Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln  
                     740                      745                      750  
 Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile  
                     755                      760                      765  
 Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile  
     770                      775                      780  
 Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn  
     785                      790                      795                      800  
 Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser  
                     805                      810                      815  
 Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu  
                     820                      825                      830  
 Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser  
                     835                      840                      845  
 Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
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 1                      5                      10                      15

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aac ggt gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg	96
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met	
20 25 30	
cag ccg gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg	144
Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro	
35 40 45	
gaa cgt gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca	192
Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro	
50 55 60	
ccg gaa gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg	240
Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu	
65 70 75 80	
tct acc gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg	288
Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu	
85 90 95	
ttc gag cgt att tac tcc acg gac ctg ggc cgt atg ctg ctg act agc	336
Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser	
100 105 110	
atc gtt cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa	384
Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu	
115 120 125	
ctg aaa gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt	432
Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly	
130 135 140	
tcc tat cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct	480
Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala	
145 150 155 160	
gat atc atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac	528
Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn	
165 170 175	
ctc acc cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg	576
Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro	
180 185 190	
gac ttc acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca	624
Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro	
195 200 205	
ctg ctg ggc gct ggt aaa ttc gca act gat cct gcg gtt acc ctg gct	672
Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala	
210 215 220	
cac cag ctg att cat gca ggc cac cgc ctg tac ggt atc gcc atc aat	720
His Gln Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn	
225 230 235 240	
ccg aac cgt gtc ttc aaa gtt aac acc aac gcg tat tac gag atg tcc	768
Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser	
245 250 255	
ggt ctg gaa gta agc ttc gaa gaa ctg cgt act ttt ggc ggt cac gac	816
Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp	
260 265 270	
gct aaa ttc atc gac tct ctg caa gaa aac gag ttc cgt ctg tac tac	864
Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr	

275	280	285	
tat aac aag ttc aaa gat atc gca tcc acc ctg aac aaa gcg aaa tcc Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser 290 295 300			912
atc gtg ggt acc act gct tct ctg cag tac atg aag aac gtt ttt aaa Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys 305 310 315 320			960
gaa aaa tac ctg ctc agc gaa gac acc tcc ggc aaa ttc tct gta gac Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp 325 330 335			1008
aag ttg aaa ttc gat aaa ctt tac aaa atg ctg act gaa att tac acc Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr 340 345 350			1056
gaa gac aac ttc gtt aag ttc ttt aaa gtt ctg aac cgc aaa acc tat Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr 355 360 365			1104
ctg aac ttc gac aag gca gta ttc aaa atc aac atc gtg ccg aaa gtt Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val 370 375 380			1152
aac tac act atc tac gat ggt ttc aac ctg cgt aac acc aac ctg gct Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala 385 390 395 400			1200
gct aat ttt aac ggc cag aac acg gaa atc aac aac atg aac ttc aca Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr 405 410 415			1248
aaa ctg aaa aac ttc act ggt ctg ttc gag ttt tac aag ctg ctg tgc Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys 420 425 430			1296
gta cgt ggc atc att acc tcc aaa act aaa tct ctg gac aaa ggt tat Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr 435 440 445			1344
aac aaa gcg ctg aac gac ctc tgt atc aag gtt aac aac tgg gat tta Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu 450 455 460			1392
ttc ttc agc ccg agt gaa gac aac ttc acc aac gac ctg aac aaa ggt Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly 465 470 475 480			1440
gaa gaa atc acc tca gat act aac atc gaa gca gcc gaa gaa aac atc Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile 485 490 495			1488
tcg ctg gac ctg atc cag cag tac tac ctg acc ttt aat ttc gac aac Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn 500 505 510			1536
gag ccg gaa aac att tct atc gaa aac ctg agc tct gat atc atc ggc Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly 515 520 525			1584
cag ctg gaa ctg atg ccg aac atc gaa cgt ttc cca aac ggt aaa aag Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys 530 535 540			1632

tac gag ctg gac aaa tat acc atg ttc cac tac ctg cgc gcg cag gaa Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu 545 550 555 560	1680
ttt gaa cac ggc aaa tcc cgt atc gca ctg act aac tcc gtt aac gaa Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu 565 570 575	1728
gct ctg ctc aac ccg tcc cgt gta tac acc ttc ttc tct agc gac tac Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr 580 585 590	1776
gtg aaa aag gtc aac aaa gcg act gaa gct gca atg ttc ttg ggt tgg Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp 595 600 605	1824
gtt gaa cag ctt gtt tat gat ttt acc gac gag acg tcc gaa gta tct Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser 610 615 620	1872
act acc gac aaa att gcg gat atc act atc atc atc ccg tac atc ggt Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly 625 630 635 640	1920
ccg gct ctg aac att ggc aac atg ctg tac aaa gac gac ttc gtt ggt Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly 645 650 655	1968
gca ctg atc ttc tcc ggt gcg gtg atc ctg ctg gag ttc atc ccg gaa Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu 660 665 670	2016
atc gcc atc ccg gta ctg ggc acc ttt gct ctg gtt tct tac att gca Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala 675 680 685	2064
aac aag gtt ctg act gta caa acc atc gac aac gcg ctg agc aaa cgt Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg 690 695 700	2112
aac gaa aaa tgg gat gaa gtt tac aaa tat atc gtg acc aac tgg ctg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu 705 710 715 720	2160
gct aag gtt aat act cag atc gac ctc atc cgc aaa aaa atg aaa gaa Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu 725 730 735	2208
gca ctg gaa aac cag gcg gaa gct acc aag gca atc att aac tac cag Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln 740 745 750	2256
tac aac cag tac acc gag gaa gaa aaa aac aac atc aac ttc aac atc Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile 755 760 765	2304
gac gat ctg tcc tct aaa ctg aac gaa tcc atc aac aaa gct atg atc Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile 770 775 780	2352
aac atc aac aag ttc ctg aac cag tgc tct gta agc tat ctg atg aac Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn 785 790 795 800	2400
tcc atg atc ccg tac ggt gtt aaa cgt ctg gag gac ttc gat gcg tct Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser	2448

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805	810	815	
ctg aaa gac gcc ctg ctg aaa tac att tac gac aac cgt ggc act ctg			2496
Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu			
820	825	830	
atc ggt cag gtt gat cgt ctg aag gac aaa gtg aac aat acc tta tcg			2544
Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser			
835	840	845	
acc gac atc cct ttt cag ctc agt aaa tat gtc gat aac caa cgc ctt			2592
Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu			
850	855	860	
ttg agc acg ttc aca gag tac atc aag taa tga			2625
Leu Ser Thr Phe Thr Glu Tyr Ile Lys			
865	870		

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<400> 167

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20 25 30

Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro
35 40 45

Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro
50 55 60

Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu
65 70 75 80

Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu
85 90 95

Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser
100 105 110

Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu
115 120 125

Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly
130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala
145 150 155 160

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Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Gln Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320

Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
 355 360 365

Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
 405 410 415

Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
 420 425 430



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Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu  
 450 455 460

Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly  
 465 470 475 480

Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile  
 485 490 495

Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn  
 500 505 510

Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly  
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Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys  
 530 535 540

Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu  
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Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu  
 565 570 575

Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr  
 580 585 590

Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp  
 595 600 605

Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser  
 610 615 620

Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly  
 625 630 635 640

Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly  
 645 650 655

Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu  
 660 665 670

Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala  
 675 680 685

Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg

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690	695	700	
Asn Glu Lys Trp Asp 705	Glu Val Tyr Lys Tyr 710	Ile Val Thr Asn Trp Leu 715 720	
Ala Lys Val Asn Thr 725	Gln Ile Asp Leu Ile 730	Arg Lys Lys Met Lys Glu 735	
Ala Leu Glu Asn Gln 740	Ala Glu Ala Thr Lys 745	Ala Ile Ile Asn Tyr Gln 750	
Tyr Asn Gln Tyr Thr 755	Glu Glu Glu Lys Asn 760	Asn Ile Asn Phe Asn Ile 765	
Asp Asp Leu Ser Ser 770	Lys Leu Asn Glu Ser 775	Ile Asn Lys Ala Met Ile 780	
Asn Ile Asn Lys Phe 785	Leu Asn Gln Cys Ser 790	Val Ser Tyr Leu Met Asn 795 800	
Ser Met Ile Pro Tyr 805	Gly Val Lys Arg Leu 810	Glu Asp Phe Asp Ala Ser 815	
Leu Lys Asp Ala Leu 820	Leu Lys Tyr Ile Tyr 825	Asp Asn Arg Gly Thr Leu 830	
Ile Gly Gln Val Asp 835	Arg Leu Lys Asp Lys 840	Val Asn Asn Thr Leu Ser 845	
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1 5 10 15			
aac ggt gtt gac att gct tac atc aaa atc ccg aac gct ggc cag atg			96
Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met			
20 25 30			

cag ccg gta aag gca ttc aaa atc cac aac aaa atc tgg gtt atc ccg Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro 35 40 45	144
gaa cgt gat acc ttt act aac ccg gaa gaa ggt gac ctg aac ccg cca Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro 50 55 60	192
ccg gaa gcg aaa cag gtg ccg gta tct tac tat gac tcc acc tac ctg Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu 65 70 75 80	240
tct acc gat aac gaa aag gac aac tac ctg aaa ggt gtt act aaa ctg Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu 85 90 95	288
ttc gag cgt att tac tcc acc gac ctg ggc cgt atg ctg ctg act agc Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser 100 105 110	336
atc gtt cgc ggt atc ccg ttc tgg ggc ggt tct acc atc gat acc gaa Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu 115 120 125	384
ctg aaa gta atc gac act aac tgc atc aac gtt att cag ccg gac ggt Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly 130 135 140	432
tcc tat cgt tcc gaa gaa ctg aac ctg gtg atc atc ggc ccg tct gct Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala 145 150 155 160	480
gat atc atc cag ttc gag tgt aag agc ttt ggt cac gaa gtt ctg aac Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn 165 170 175	528
ctc acc cgt aac ggc tac ggt tcc act cag tac atc cgt ttc tct ccg Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro 180 185 190	576
gac ttc acc ttc ggt ttt gaa gaa tcc ctg gaa gta gac acg aac cca Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro 195 200 205	624
ctg ctg ggc gct ggt aaa ttc gca act gat cct gcg gtt acc ctg gct Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala 210 215 220	672
cac cag ctg att tat gca ggc cac cgc ctg tac ggt atc gcc atc aat His Gln Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn 225 230 235 240	720
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ggt ctg gaa gta agc ttc gaa gaa ctg cgt act ttt ggc ggt cac gac Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp 260 265 270	816
gct aaa ttc atc gac tct ctg caa gaa aac gag ttc cgt ctg tac tac Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr 275 280 285	864
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290	295	300	
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gaa aaa tac ctg ctc agc gaa gac acc tcc ggc aaa ttc tct gta gac Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp 325 330 335			1008
aag ttg aaa ttc gat aaa ctt tac aaa atg ctg act gaa att tac acc Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr 340 345 350			1056
gaa gac aac ttc gtt aag ttc ttt aaa gtt ctg aac cgc aaa acc tat Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr 355 360 365			1104
ctg aac ttc gac aag gca gta ttc aaa atc aac atc gtg ccg aaa gtt Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val 370 375 380			1152
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gct aat ttt aac ggc cag aac acg gaa atc aac aac atg aac ttc aca Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr 405 410 415			1248
aaa ctg aaa aac ttc act ggt ctg ttc gag ttt tac aag ctg ctg tgc Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys 420 425 430			1296
gta cgt ggc atc att acc tcc aaa act aaa tct ctg gac aaa ggt tat Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr 435 440 445			1344
aac aaa gcg ctg aac gac ctc tgt atc aag gtt aac aac tgg gat tta Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu 450 455 460			1392
ttc ttc agc ccg agt gaa gac aac ttc acc aac gac ctg aac aaa ggt Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly 465 470 475 480			1440
gaa gaa atc acc tca gat act aac atc gaa gca gcc gaa gaa aac atc Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile 485 490 495			1488
tcg ctg gac ctg atc cag cag tac tac ctg acc ttt aat ttc gac aac Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn 500 505 510			1536
gag ccg gaa aac att tct atc gaa aac ctg agc tct gat atc atc ggc Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly 515 520 525			1584
cag ctg gaa ctg atg ccg aac atc gaa cgt ttc cca aac ggt aaa aag Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys 530 535 540			1632
tac gag ctg gac aaa tat acc atg ttc cac tac ctg cgc gcg cag gaa Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu 545 550 555 560			1680

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ttt gaa cac ggc aaa tcc cgt atc gca ctg act aac tcc gtt aac gaa Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu 565 570 575	1728
gct ctg ctc aac ccg tcc cgt gta tac acc ttc ttc tct agc gac tac Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr 580 585 590	1776
gtg aaa aag gtc aac aaa gcg act gaa gct gca atg ttc ttg ggt tgg Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp 595 600 605	1824
gtt gaa cag ctt gtt tat gat ttt acc gac gag acg tcc gaa gta tct Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser 610 615 620	1872
act acc gac aaa att gcg gat atc act atc atc atc ccg tac atc ggt Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly 625 630 635 640	1920
ccg gct ctg aac att gcg aac atg ctg tac aaa gac gac ttc gtt ggt Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly 645 650 655	1968
gca ctg atc ttc tcc ggt gcg gtg atc ctg ctg gag ttc atc ccg gaa Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu 660 665 670	2016
atc gcc atc ccg gta ctg gcc acc ttt gct ctg gtt tct tac att gca Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala 675 680 685	2064
aac aag gtt ctg act gta caa acc atc gac aac gcg ctg agc aaa cgt Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg 690 695 700	2112
aac gaa aaa tgg gat gaa gtt tac aaa tat atc gtg acc aac tgg ctg Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu 705 710 715 720	2160
gct aag gtt aat act cag atc gac ctc atc cgc aaa aaa atg aaa gaa Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu 725 730 735	2208
gca ctg gaa aac cag gcg gaa gct acc aag gca atc att aac tac cag Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln 740 745 750	2256
tac aac cag tac acc gag gaa gaa aaa aac aac atc aac ttc aac atc Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile 755 760 765	2304
gac gat ctg tcc tct aaa ctg aac gaa tcc atc aac aaa gct atg atc Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile 770 775 780	2352
aac atc aac aag ttc ctg aac cag tgc tct gta agc tat ctg atg aac Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn 785 790 795 800	2400
tcc atg atc ccg tac ggt gtt aaa cgt ctg gag gac ttc gat gcg tct Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser 805 810 815	2448
ctg aaa gac gcc ctg ctg aaa tac att tac gac aac cgt gcc act ctg Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu 815 820 825	2496

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820	825	830	
atc ggt cag gtt gat cgt ctg aag gac aaa gtg aac aat acc tta tcg			2544
Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser			
835	840	845	
acc gac atc cct ttt cag ctc agt aaa tat gtc gat aac caa cgc ctt			2592
Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu			
850	855	860	
ttg agc acg ttc aca gag tac atc aag taa tga			2625
Leu Ser Thr Phe Thr Glu Tyr Ile Lys			
865	870		

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 <212> PRT  
 <213> Clostridium botulinum

<400> 169

Gly Ser Met Glu Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val  
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Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
 20 25 30

Gln Pro Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro  
 35 40 45

Glu Arg Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro  
 50 55 60

Pro Glu Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu  
 65 70 75 80

Ser Thr Asp Asn Glu Lys Asp Asn Tyr Leu Lys Gly Val Thr Lys Leu  
 85 90 95

Phe Glu Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser  
 100 105 110

Ile Val Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu  
 115 120 125

Leu Lys Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly  
 130 135 140

Ser Tyr Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala  
 145 150 155 160

Asp Ile Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn  
 165 170 175

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Leu Thr Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro  
 180 185 190

Asp Phe Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro  
 195 200 205

Leu Leu Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala  
 210 215 220

His Gln Leu Ile Tyr Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn  
 225 230 235 240

Pro Asn Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser  
 245 250 255

Gly Leu Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp  
 260 265 270

Ala Lys Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr  
 275 280 285

Tyr Asn Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser  
 290 295 300

Ile Val Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys  
 305 310 315 320

Glu Lys Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp  
 325 330 335

Lys Leu Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr  
 340 345 350

Glu Asp Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr  
 355 360 365

Leu Asn Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val  
 370 375 380

Asn Tyr Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala  
 385 390 395 400

Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
 405 410 415

Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
 420 425 430

Val Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr  
 435 440 445

Asn Lys Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp Asp Leu  
 450 455 460

Phe Phe Ser Pro Ser Glu Asp Asn Phe Thr Asn Asp Leu Asn Lys Gly  
 465 470 475 480

Glu Glu Ile Thr Ser Asp Thr Asn Ile Glu Ala Ala Glu Glu Asn Ile  
 485 490 495

Ser Leu Asp Leu Ile Gln Gln Tyr Tyr Leu Thr Phe Asn Phe Asp Asn  
 500 505 510

Glu Pro Glu Asn Ile Ser Ile Glu Asn Leu Ser Ser Asp Ile Ile Gly  
 515 520 525

Gln Leu Glu Leu Met Pro Asn Ile Glu Arg Phe Pro Asn Gly Lys Lys  
 530 535 540

Tyr Glu Leu Asp Lys Tyr Thr Met Phe His Tyr Leu Arg Ala Gln Glu  
 545 550 555 560

Phe Glu His Gly Lys Ser Arg Ile Ala Leu Thr Asn Ser Val Asn Glu  
 565 570 575

Ala Leu Leu Asn Pro Ser Arg Val Tyr Thr Phe Phe Ser Ser Asp Tyr  
 580 585 590

Val Lys Lys Val Asn Lys Ala Thr Glu Ala Ala Met Phe Leu Gly Trp  
 595 600 605

Val Glu Gln Leu Val Tyr Asp Phe Thr Asp Glu Thr Ser Glu Val Ser  
 610 615 620

Thr Thr Asp Lys Ile Ala Asp Ile Thr Ile Ile Ile Pro Tyr Ile Gly  
 625 630 635 640

Pro Ala Leu Asn Ile Gly Asn Met Leu Tyr Lys Asp Asp Phe Val Gly  
 645 650 655

Ala Leu Ile Phe Ser Gly Ala Val Ile Leu Leu Glu Phe Ile Pro Glu  
 660 665 670

Ile Ala Ile Pro Val Leu Gly Thr Phe Ala Leu Val Ser Tyr Ile Ala  
 675 680 685

Asn Lys Val Leu Thr Val Gln Thr Ile Asp Asn Ala Leu Ser Lys Arg  
 690 695 700

Asn Glu Lys Trp Asp Glu Val Tyr Lys Tyr Ile Val Thr Asn Trp Leu



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705                      710                      715                      720

Ala Lys Val Asn Thr Gln Ile Asp Leu Ile Arg Lys Lys Met Lys Glu  
725                      730                      735

Ala Leu Glu Asn Gln Ala Glu Ala Thr Lys Ala Ile Ile Asn Tyr Gln  
740                      745                      750

Tyr Asn Gln Tyr Thr Glu Glu Glu Lys Asn Asn Ile Asn Phe Asn Ile  
755                      760                      765

Asp Asp Leu Ser Ser Lys Leu Asn Glu Ser Ile Asn Lys Ala Met Ile  
770                      775                      780

Asn Ile Asn Lys Phe Leu Asn Gln Cys Ser Val Ser Tyr Leu Met Asn  
785                      790                      795                      800

Ser Met Ile Pro Tyr Gly Val Lys Arg Leu Glu Asp Phe Asp Ala Ser  
805                      810                      815

Leu Lys Asp Ala Leu Leu Lys Tyr Ile Tyr Asp Asn Arg Gly Thr Leu  
820                      825                      830

Ile Gly Gln Val Asp Arg Leu Lys Asp Lys Val Asn Asn Thr Leu Ser  
835                      840                      845

Thr Asp Ile Pro Phe Gln Leu Ser Lys Tyr Val Asp Asn Gln Arg Leu  
850                      855                      860

Leu Ser Thr Phe Thr Glu Tyr Ile Lys  
865                      870

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<220>  
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<222> (1)..(2592)

<400> 170

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Met	Pro	Val	Thr	Ile	Asn	Asn	Phe	Asn	Tyr	Asn	Asp	Pro	Ile	Asp	Asn	
1				5				10						15		
aac	aac	atc	atc	atg	atg	gaa	ccg	ccg	ttc	gca	cgt	ggt	acc	ggt	cgt	96
Asn	Asn	Ile	Ile	Met	Met	Glu	Pro	Pro	Phe	Ala	Arg	Gly	Thr	Gly	Arg	
			20					25					30			
tac	tac	aag	gct	ttt	aag	atc	acc	gac	cgt	atc	tgg	atc	atc	ccg	gaa	144
Tyr	Tyr	Lys	Ala	Phe	Lys	Ile	Thr	Asp	Arg	Ile	Trp	Ile	Ile	Pro	Glu	
			35				40				45					

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cgt tac acc ttc ggt tac aaa cct gag gac ttc aac aag agt agc ggg Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly 50 55 60	192
att ttc aat cgt gac gtc tgc gag tac tat gat cca gat tat ctg aat Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn 65 70 75 80	240
acc aac gat aag aag aac ata ttc ctt cag act atg atc aaa ctc ttc Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe 85 90 95	288
aac cgt atc aaa agc aaa ccg ctc ggt gaa aaa ctc ctc gaa atg att Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile 100 105 110	336
atc aac ggt atc ccg tac ctc ggt gac cgt cgt gtc ccg ctc gaa gag Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu 115 120 125	384
ttc aac acc aac atc gca agc gtc acc gtc aac aaa ctc atc agc aac Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn 130 135 140	432
cca ggt gaa gtc gaa cgt aaa aaa ggt atc ttc gca aac ctc atc atc Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile 145 150 155 160	480
ttc ggt ccg ggt ccg gtc ctc aac gaa aac gaa acc atc gac atc ggt Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly 165 170 175	528
atc cag aac cac ttc gca agc cgt gaa ggt ttc ggt ggt atc atg cag Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln 180 185 190	576
atg aaa ttc tgc ccg gaa tac gtc agc gtc ttc aac aac gtc cag gaa Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu 195 200 205	624
aac aaa ggt gca agc atc ttc aac cgt cgt ggt tac ttc agc gac ccg Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro 210 215 220	672
gca ctc atc ctc atg cat gaa ctc atc cac gtc ctc cac ggt ctc tac Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr 225 230 235 240	720
ggt atc aaa gtt gac gac ctc ccg atc gtc ccg aac gag aag aaa ttc Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe 245 250 255	768
ttc atg cag agc acc gac gca atc cag gct gag gaa ctc tac acc ttc Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe 260 265 270	816
ggt ggc caa gac cca agt atc ata acc ccg tcc acc gac aaa agc atc Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile 275 280 285	864
tac gac aaa gtc ctc cag aac ttc agg ggt atc gtg gac aga ctc aac Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn 290 295 300	912
aaa gtc ctc gtc tgc atc agc gac ccg aac atc aat atc aac ata tac Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr	960

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305	310	315	320	
aag aac aag ttc	aaa gac aag tac	aaa ttc gtc gag gac agc	gaa ggc	1008
Lys Asn Lys Phe	Lys Asp Lys Tyr	Lys Phe Val Glu Asp Ser	Glu Gly	
	325	330	335	
aaa tac agc atc	gac gta gaa agt ttc	gac aag ctc tac	aaa agc ctc	1056
Lys Tyr Ser Ile	Asp Val Glu Ser	Phe Asp Lys Leu Tyr	Lys Ser Leu	
	340	345	350	
atg ttc ggt ttc	acc gaa acc aac atc	gcc gag aac tac	aag atc aag	1104
Met Phe Gly Phe	Thr Glu Thr Asn Ile	Ala Glu Asn Tyr	Lys Ile Lys	
	355	360	365	
aca agg gca agt	tac ttc agc gac agc	ctc ccg cct gtc	aaa atc aag	1152
Thr Arg Ala Ser	Tyr Phe Ser Asp Ser	Leu Pro Pro Val	Lys Ile Lys	
	370	375	380	
aac ctc tta gac	aac gag att tac	act ata gaa gag	ggc ttc aac atc	1200
Asn Leu Leu Asp	Asn Glu Ile Tyr	Thr Ile Glu Glu	Gly Phe Asn Ile	
	385	390	400	
agt gac aaa gac	atg gag aag gaa	tac aga ggt cag	aac aag gct atc	1248
Ser Asp Lys Asp	Met Glu Lys Glu	Tyr Arg Gly Gln	Asn Lys Ala Ile	
	405	410	415	
aac aaa cag gca	tac gag gag atc	agc aaa gaa cac	ctc gca gtc tac	1296
Asn Lys Gln Ala	Tyr Glu Glu Ile	Ser Lys Glu His	Leu Ala Val Tyr	
	420	425	430	
aag atc cag atg	tgt agc gct atc	gaa ggc cga tgc	agc gct ccg ggt	1344
Lys Ile Gln Met	Cys Ser Ala Ile	Glu Gly Arg Cys	Ser Ala Pro Gly	
	435	440	445	
atc tgc atc gac	gtt gac aac gaa	gac ctg ttc ttc	atc gct gac aaa	1392
Ile Cys Ile Asp	Val Asp Asn Glu	Asp Leu Phe Phe	Ile Ala Asp Lys	
	450	455	460	
aac agc ttc agt	gac gac ctg agc	aaa aac gaa cgt	atc gaa tac aac	1440
Asn Ser Phe Ser	Asp Asp Leu Ser	Lys Asn Glu Arg	Ile Glu Tyr Asn	
	465	470	480	
acc cag agc aac	tac atc gaa aac	gac ttc ccg atc	aac gaa ctg atc	1488
Thr Gln Ser Asn	Tyr Ile Glu Asn	Asp Phe Pro Ile	Asn Glu Leu Ile	
	485	490	495	
ctg gac acc gac	ctg ata agt aaa	atc gaa ctg ccg	agc gaa aac acc	1536
Leu Asp Thr Asp	Leu Ile Ser Lys	Ile Glu Leu Pro	Ser Glu Asn Thr	
	500	505	510	
gaa agt ctg acc	gac ttc aac gtt	gac gtt ccg gtt	tac gaa aaa cag	1584
Glu Ser Leu Thr	Asp Phe Asn Val	Asp Val Pro Val	Tyr Glu Lys Gln	
	515	520	525	
ccg gct atc aag	aaa atc ttc acc	gac gaa aac acc	atc ttc cag tac	1632
Pro Ala Ile Lys	Lys Ile Phe Thr	Asp Glu Asn Thr	Ile Phe Gln Tyr	
	530	535	540	
ctg tac agc cag	acc ttc ccg ctg	gac atc cgt gac	atc agt ctg acc	1680
Leu Tyr Ser Gln	Thr Phe Pro Leu	Asp Ile Arg Asp	Ile Ser Leu Thr	
	545	550	555	
agc agt ttc gac	gac gct ctg ctg	ttc agc aac aaa	gtt tac agt ttc	1728
Ser Ser Phe Asp	Asp Ala Leu Leu	Phe Ser Asn Lys	Val Tyr Ser Phe	
	565	570	575	

ttc agc atg gac tac atc aaa acc gct aac aaa gtt gtt gaa gca ggg	1776
Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly	
580 585 590	
ctg ttc gct ggt tgg gtt aaa cag atc gtt aac gac ttc gtt atc gaa	1824
Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu	
595 600 605	
gct aac aaa agc aac act atg gac aaa atc gct gac atc agt ctg atc	1872
Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile	
610 615 620	
gtt ccg tac atc ggt ctg gct ctg aac gtt ggt aac gaa acc gct aaa	1920
Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys	
625 630 635 640	
ggt aac ttt gaa aac gct ttc gag atc gct ggt gca agc atc ctg ctg	1968
Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu	
645 650 655	
gag ttc atc ccg gaa ctg ctg atc ccg gtt gtt ggt gct ttc ctg ctg	2016
Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu	
660 665 670	
gaa agt tac atc gac aac aaa aac aag atc atc aaa acc atc gac aac	2064
Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn	
675 680 685	
gct ctg acc aaa cgt aac gaa aaa tgg agt gat atg tac ggt ctg atc	2112
Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile	
690 695 700	
gtt gct cag tgg ctg agc acc gtc aac acc cag ttc tac acc atc aaa	2160
Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys	
705 710 715 720	
gaa ggt atg tac aaa gct ctg aac tac cag gct cag gct ctg gaa gag	2208
Glu Gly Met Tyr Lys-Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu	
725 730 735	
atc atc aaa tac cgt tac aac atc tac agt gag aag gaa aag agt aac	2256
Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn	
740 745 750	
atc aac atc gac ttc aac gac atc aac agc aaa ctg aac gaa ggt atc	2304
Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile	
755 760 765	
aac cag gct atc gac aac atc aac aac ttc atc aac ggt tgc agt gtt	2352
Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val	
770 775 780	
agc tac ctg atg aag aag atg atc ccg ctg gct gtt gaa aaa ctg ctg	2400
Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu	
785 790 795 800	
gac ttc gac aac acc ctg aaa aag aac ctg ctg aac tac atc gac gaa	2448
Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu	
805 810 815	
aac aag ctg tac ctg atc ggt agt gct gaa tac gaa aaa agt aaa gtg	2496
Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val	
820 825 830	
aac aaa tac ctg aag acc atc atg ccg ttc gac ctg agt atc tac acc	2544
Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr	

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835	840	845	
aac gac acc atc ctg atc gaa atg ttc aac aaa tac aac agc taa tag			2592
Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser			
850	855	860	

<210> 171  
 <211> 862  
 <212> PRT  
 <213> Clostridium botulinum

<400> 171

Met	Pro	Val	Thr	Ile	Asn	Asn	Phe	Asn	Tyr	Asn	Asp	Pro	Ile	Asp	Asn
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Asn	Asn	Ile	Ile	Met	Met	Glu	Pro	Pro	Phe	Ala	Arg	Gly	Thr	Gly	Arg
		20						25					30		

Tyr	Tyr	Lys	Ala	Phe	Lys	Ile	Thr	Asp	Arg	Ile	Trp	Ile	Ile	Pro	Glu
		35					40					45			

Arg	Tyr	Thr	Phe	Gly	Tyr	Lys	Pro	Glu	Asp	Phe	Asn	Lys	Ser	Ser	Gly
	50					55					60				

Ile	Phe	Asn	Arg	Asp	Val	Cys	Glu	Tyr	Tyr	Asp	Pro	Asp	Tyr	Leu	Asn
65					70					75					80

Thr	Asn	Asp	Lys	Lys	Asn	Ile	Phe	Leu	Gln	Thr	Met	Ile	Lys	Leu	Phe
			85						90					95	

Asn	Arg	Ile	Lys	Ser	Lys	Pro	Leu	Gly	Glu	Lys	Leu	Leu	Glu	Met	Ile
			100					105					110		

Ile	Asn	Gly	Ile	Pro	Tyr	Leu	Gly	Asp	Arg	Arg	Val	Pro	Leu	Glu	Glu
		115					120					125			

Phe	Asn	Thr	Asn	Ile	Ala	Ser	Val	Thr	Val	Asn	Lys	Leu	Ile	Ser	Asn
	130					135					140				

Pro	Gly	Glu	Val	Glu	Arg	Lys	Lys	Gly	Ile	Phe	Ala	Asn	Leu	Ile	Ile
145					150					155					160

Phe	Gly	Pro	Gly	Pro	Val	Leu	Asn	Glu	Asn	Glu	Thr	Ile	Asp	Ile	Gly
				165					170					175	

Ile	Gln	Asn	His	Phe	Ala	Ser	Arg	Glu	Gly	Phe	Gly	Gly	Ile	Met	Gln
			180					185					190		

Met	Lys	Phe	Cys	Pro	Glu	Tyr	Val	Ser	Val	Phe	Asn	Asn	Val	Gln	Glu
		195					200					205			

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Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
 210 215 220

Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255

Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
 260 265 270

Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Ile Asn  
 290 295 300

Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
 305 310 315 320

Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
 325 330 335

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
 340 345 350

Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
 355 360 365

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
 370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
 385 390 395 400

Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
 405 410 415

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr  
 420 425 430

Lys Ile Gln Met Cys Ser Ala Ile Glu Gly Arg Cys Ser Ala Pro Gly  
 435 440 445

Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys  
 450 455 460

Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn  
 465 470 475 480

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Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile  
 485 490 495

Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr  
 500 505 510

Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln  
 515 520 525

Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr  
 530 535 540

Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr  
 545 550 555 560

Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe  
 565 570 575

Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly  
 580 585 590

Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu  
 595 600 605

Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile  
 610 615 620

Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys  
 625 630 635 640

Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu  
 645 650 655

Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu  
 660 665 670

Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn  
 675 680 685

Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile  
 690 695 700

Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys  
 705 710 715 720

Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu  
 725 730 735

Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn

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740	745	750	
Ile Asn Ile Asp Phe Asn Asp 755	Ile Asn Ser Lys Leu Asn 760	Glu Gly Ile 765	
Asn Gln Ala Ile Asp Asn Ile 770	Asn Asn Phe Ile 775	Asn Gly Cys Ser Val 780	
Ser Tyr Leu Met Lys 785	Lys Met Ile Pro Leu Ala Val 790	Glu Lys Leu Leu 800	
Asp Phe Asp Asn Thr 805	Leu Lys Lys Asn Leu Leu 810	Asn Tyr Ile Asp Glu 815	
Asn Lys Leu Tyr Leu Ile Gly Ser 820	Ala Glu Tyr Glu Lys 825	Ser Lys Val 830	
Asn Lys Tyr Leu Lys Thr Ile Met 835	Pro Phe Asp Leu Ser 840	Ile Tyr Thr 845	
Asn Asp Thr Ile Leu Ile Glu Met 850	Phe Asn Lys Tyr Asn Ser 855		
<p>&lt;210&gt; 172</p> <p>&lt;211&gt; 2592</p> <p>&lt;212&gt; DNA</p> <p>&lt;213&gt; Clostridium_botulinum</p>			
<p>&lt;220&gt;</p> <p>&lt;221&gt; CDS</p> <p>&lt;222&gt; (1)..(2592)</p>			
<p>&lt;400&gt; 172</p>			
atg ccg gtt acc atc aac aac ttc aac tac aac gac ccg atc gac aac Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn 1 5 10 15	48		
aac aac atc att atg atg gaa ccg ccg ttc gca cgt ggt acc ggt cgt Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg 20 25 30	96		
tac tgc aag gct ttc aag atc acc gac cgt atc tgg atc atc ccg gaa Tyr Cys Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu 35 40 45	144		
cgt tac acc ttc ggt tac aaa cct gag gac ttc aac aag agt agc ggg Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly 50 55 60	192		
att ttc aat cgt gac gtc tgc gag tac tat gat cca gat tat ctg aat Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn 65 70 75 80	240		
acc aac gat aag aag aac ata ttc ttt cag act atg atc aaa ctc ttc Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Met Ile Lys Leu Phe 85 90 95	288		



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aac cgt atc aaa agc aaa ccg ctc ggt gaa aaa ctc ctc gaa atg att	336
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile	
100 105 110	
atc aac ggt atc ccg tac ctc ggt gac cgt cgt gtc ccg ctt gaa gag	384
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu	
115 120 125	
ttc aac acc aac atc gca agc gtc acc gtc aac aaa ctc atc agc aac	432
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn	
130 135 140	
cca ggt gaa gtc gaa cgt aaa aaa ggt atc ttc gca aac ctc atc atc	480
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile	
145 150 155 160	
ttc ggt ccg ggt ccg gtc ctc aac gaa aac gaa acc atc gac atc ggt	528
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly	
165 170 175	
atc cag aac cac ttc gca agc cgt gaa ggt ttc ggt ggt atc atg cag	576
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln	
180 185 190	
atg aaa ttc tgc ccg gaa tac gtc agt gtc ttc aac aac gtc cag gaa	624
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu	
195 200 205	
aac aaa ggt gca agc atc ttc aac cgt cgt ggt tac ttc agc gac ccg	672
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro	
210 215 220	
gca ctc atc ctc atg cat gaa ctc atc cac gtc ctc cac ggt ctc tac	720
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr	
225 230 235 240	
ggt atc aaa gtt gac gac ctc ccg atc gtc ccg aac gag aag aaa ttc	768
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe	
245 250 255	
ttc atg cag agc acc gac gca atc cag gct gag gaa ctc tac acc ttc	816
Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe	
260 265 270	
ggt ggc caa gac cca agt atc ata acc ccg tcc acc gac aaa agc atc	864
Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile	
275 280 285	
tac gac aaa gtc ctc cag aac ttc agg ggt atc gtg gac aga ctc aac	912
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn	
290 295 300	
aaa gtc ctc gtc tgc atc agc gac ccg aac atc aat atc aac ata tac	960
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr	
305 310 315 320	
aag aac aag ttc aaa gac aag tac aaa ttc gtc gag gac agc gaa ggc	1008
Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly	
325 330 335	
aaa tac agc atc gac gta gaa agt ttc gac aag ctc tac aaa agc ctc	1056
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu	
340 345 350	
atg ttc ggt ttc acc gaa acc aac atc gcc gag aac tac aag atc aag	1104
Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys	

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355	360	365	
aca agg gca agt tac ttc agc gag agc ctc ccg cct gtc aaa atc aag Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys 370 375 380			1152
aac ctc tta gac aac gag att tac act ata gaa gag ggc ttc aac atc Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile 385 390 395 400			1200
agt gac aaa gac atg gag aag gaa tac aga ggt cag aac aag gct atc Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile 405 410 415			1248
aac aaa cag gca tac gag gag atc agc aaa gaa cac ctc gca gtc tac Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr 420 425 430			1296
aag atc cag atg tgt agc gct atc gaa ggc cga tgc agc gct ccg ggt Lys Ile Gln Met Cys Ser Ala Ile Glu Gly Arg Cys Ser Ala Pro Gly 435 440 445			1344
atc tgc atc gac gtt gac aac gaa gac ctg ttc ttc atc gct gac aaa Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys 450 455 460			1392
aac agc ttc agt gac gac ctg agc aaa aac gaa cgt atc gaa tac aac Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn 465 470 475 480			1440
acc cag agc aac tac atc gaa aac gac ttc ccg atc aac gaa ctg atc Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile 485 490 495			1488
ctg gac acc gac ctg ata agt aaa atc gaa ctg ccg agc gaa aac acc Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr 500 505 510			1536
gaa agt ctg acc gac ttc aac gtt gac gtt ccg gtt tac gaa aaa cag Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln 515 520 525			1584
ccg gct atc aag aaa atc ttc acc gac gaa aac acc atc ttc cag tac Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr 530 535 540			1632
ctg tac agc cag acc ttc ccg ctg gac atc cgt gac atc agt ctg acc Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr 545 550 555 560			1680
agc agt ttc gac gac gct ctg ctg ttc agc aac aaa gtt tac agt ttc Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe 565 570 575			1728
ttc agc atg gac tac atc aaa acc gct aac aaa gtt gtt gaa gca ggg Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly 580 585 590			1776
ctg ttc gct ggt tgg gtt aaa cag atc gtt aac gac ttc gtt atc gaa Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu 595 600 605			1824
gct aac aaa agc aac act atg gac aaa atc gct gac atc agt ctg atc Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile 610 615 620			1872

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ggt ccg tac atc ggt ctg gct ctg aac gtt ggt aac gaa acc gct aaa	1920
Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys	
625 630 635 640	
ggt aac ttt gaa aac gct ttc gag atc gct ggt gca agc atc ctg ctg	1968
Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu	
645 650 655	
gag ttc atc ccg gaa ctg ctg atc ccg gtt gtt ggt gct ttc ctg ctg	2016
Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu	
660 665 670	
gaa agt tac atc gac aac aaa aac aag atc atc aaa acc atc gac aac	2064
Glu Ser Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn	
675 680 685	
gct ctg acc aaa cgt aac gaa aaa tgg agt gat atg tac ggt ctg atc	2112
Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile	
690 695 700	
ggt gct cag tgg ctg agc acc gtc aac acc cag ttc tac acc atc aaa	2160
Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys	
705 710 715 720	
gaa ggt atg tac aaa gct ctg aac tac cag gct cag gct ctg gaa gag	2208
Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu	
725 730 735	
atc atc aaa tac cgt tac aac atc tac agt gag aag gaa aag agt aac	2256
Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn	
740 745 750	
atc aac atc gac ttc aac gac atc aac agc aaa ctg aac gaa ggt atc	2304
Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile	
755 760 765	
aac cag gct atc gac aac atc aac aac ttc atc aac ggt tgc agt gtt	2352
Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val	
770 775 780	
agc tac ctg atg aag aag atg atc ccg ctg gct gtt gaa aaa ctg ctg	2400
Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu	
785 790 795 800	
gac ttc gac aac acc ctg aaa aag aac ctg ctg aac tac atc gac gaa	2448
Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu	
805 810 815	
aac aag ctg tac ctg atc ggt agt gct gaa tac gaa aaa agt aaa gtg	2496
Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val	
820 825 830	
aac aaa tac ctg aag acc atc atg ccg ttc gac ctg agt atc tac acc	2544
Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr	
835 840 845	
aac gac acc atc ctg atc gaa atg ttc aac aaa tac aac agc taa tag	2592
Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser	
850 855 860	

&lt;210&gt; 173

&lt;211&gt; 862

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 173

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
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Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg  
 20 25 30

Tyr Cys Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
 35 40 45

Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
 50 55 60

Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
 65 70 75 80

Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Met Ile Lys Leu Phe  
 85 90 95

Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
 100 105 110

Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
 115 120 125

Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
 130 135 140

Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
 145 150 155 160

Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
 165 170 175

Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
 180 185 190

Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
 195 200 205

Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
 210 215 220

Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255

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Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
 260 265 270

Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
 290 295 300

Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
 305 310 315 320

Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
 325 330 335

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
 340 345 350

Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
 355 360 365

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
 370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
 385 390 395 400

Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
 405 410 415

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr  
 420 425 430

Lys Ile Gln Met Cys Ser Ala Ile Glu Gly Arg Cys Ser Ala Pro Gly  
 435 440 445

Ile Cys Ile Asp Val Asp Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys  
 450 455 460

Asn Ser Phe Ser Asp Asp Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn  
 465 470 475 480

Thr Gln Ser Asn Tyr Ile Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile  
 485 490 495

Leu Asp Thr Asp Leu Ile Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr  
 500 505 510

Glu Ser Leu Thr Asp Phe Asn Val Asp Val Pro Val Tyr Glu Lys Gln  
 515 520 525

Pro Ala Ile Lys Lys Ile Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr  
 530 535 540

Leu Tyr Ser Gln Thr Phe Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr  
 545 550 555 560

Ser Ser Phe Asp Asp Ala Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe  
 565 570 575

Phe Ser Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly  
 580 585 590

Leu Phe Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu  
 595 600 605

Ala Asn Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile  
 610 615 620

Val Pro Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys  
 625 630 635 640

Gly Asn Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu  
 645 650 655

Glu Phe Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu  
 660 665 670

Glu Ser Tyr Ile Asp-Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn  
 675 680 685

Ala Leu Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile  
 690 695 700

Val Ala Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys  
 705 710 715 720

Glu Gly Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu  
 725 730 735

Ile Ile Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn  
 740 745 750

Ile Asn Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile  
 755 760 765

Asn Gln Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val  
 770 775 780

Ser Tyr Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu

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785	790	795	800
Asp Phe Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu	805	810	815
Asn Lys Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val	820	825	830
Asn Lys Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr	835	840	845
Asn Asp Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser	850	855	860

<210> 174  
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 <212> DNA  
 <213> Clostridium botulinum

<220>  
 <221> CDS  
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Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn	
1 5 10 15	
aac aac atc att atg atg gaa ccg ccg ttc gca cgt ggt acc gga cgt	96
Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg	
20 25 30	
tac tac aag gct ttt aag atc acc gac cgt atc tgg atc atc ccg gaa	144
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu	
35 40 45	
cgt tac acc ttc ggt tac aaa cct gag gac ttc aac aag agt agc ggg	192
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly	
50 55 60	
att ttc aat cgt gac gtc tgc gag tac tat gat cca gat tat ctg aat	240
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn	
65 70 75 80	
acc aac gat aag aag aac ata ttc ctt cag act atg att aaa ctc ttc	288
Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe	
85 90 95	
aac cgt atc aaa agc aaa ccg ctc ggt gaa aaa ctc ctc gaa atg att	336
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile	
100 105 110	
atc aac ggt atc ccg tac ctc ggt gac cgt cgt gtc ccg ctt gaa gag	384
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu	
115 120 125	
ttc aac acc aac atc gca agc gtc acc gtc aac aaa ctc atc agc aac	432
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn	
130 135 140	

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cca ggt gaa gtc gaa cgt aaa aaa ggt atc ttc gca aac ctc atc atc Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile 145 150 155 160	480
ttc ggt ccg ggt ccg gtc ctc aac gaa aac gaa acc atc gac atc ggt Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly 165 170 175	528
atc cag aac cac ttc gca agc cgt gaa ggt ttc ggt ggt atc atg cag Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln 180 185 190	576
atg aaa ttc tgc ccg gaa tac gtc agt gtc ttc aac aac gtc cag gaa Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu 195 200 205	624
aac aaa ggt gca agc atc ttc aac cgt cgt ggt tac ttc agc gac ccg Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro 210 215 220	672
gca ctc atc ctc atg cat gaa ctc atc cac gtc ctc cac ggt ctc tac Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr 225 230 235 240	720
ggt atc aaa gtt gac gac ctc ccg atc gtc ccg aac gag aag aaa ttc Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe 245 250 255	768
ttc atg cag agc acc gac gca atc cag gct gag gaa ctc tac acc ttc Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe 260 265 270	816
ggt ggc caa gac cca agt atc ata acc ccg tcc acc gac aaa agc atc Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile 275 280 285	864
tac gac aaa gtc ctc cag aac ttc agg ggt atc gtg gac aga ctc aac Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn 290 295 300	912
aaa gtc ctc gtc tgc atc agc gac ccg aac atc aat atc aac ata tac Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Tyr 305 310 315 320	960
aag aac aag ttc aaa gac aag tac aaa ttc gtc gag gac agc gaa ggc Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly 325 330 335	1008
aaa tac agc atc gac gta gaa agt ttc gac aag ctc tac aaa agc ctc Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu 340 345 350	1056
atg ttc ggt ttc acc gaa acc aac atc gcc gag aac tac aag atc aag Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys 355 360 365	1104
aca agg gca agt tac ttc agc gac agc ctc ccg cct gtc aaa atc aag Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys 370 375 380	1152
aac ctc tta gac aac gag att tac act ata gaa gag ggc ttc aac atc Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile 385 390 395 400	1200
agt gac aaa gac atg gag aag gaa tac aga ggt cag aac aag gct atc Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile	1248



405								410				415					
aac	aaa	cag	gca	tac	gag	gag	atc	agc	aaa	gaa	cac	ctc	gca	gtc	tac	1296	
Asn	Lys	Gln	Ala	Tyr	Glu	Glu	Ile	Ser	Lys	Glu	His	Leu	Ala	Val	Tyr		
		420						425					430				
aag	atc	cag	atg	tgt	agc	gct	atc	gaa	ggc	cga	gct	ccc	ggg	atc	tgc	1344	
Lys	Ile	Gln	Met	Cys	Ser	Ala	Ile	Glu	Gly	Arg	Ala	Pro	Gly	Ile	Cys		
		435					440					445					
atc	gac	gtt	gac	aac	gaa	gac	ctg	ttc	ttc	atc	gct	gac	aaa	aac	agc	1392	
Ile	Asp	Val	Asp	Asn	Glu	Asp	Leu	Phe	Phe	Ile	Ala	Asp	Lys	Asn	Ser		
	450					455					460						
ttc	agt	gac	gac	ctg	agc	aaa	aac	gaa	cgt	atc	gaa	tac	aac	acc	cag	1440	
Phe	Ser	Asp	Asp	Leu	Ser	Lys	Asn	Glu	Arg	Ile	Glu	Tyr	Asn	Thr	Gln		
465					470					475					480		
agc	aac	tac	atc	gaa	aac	gac	ttc	ccg	atc	aac	gaa	ctg	atc	ctg	gac	1488	
Ser	Asn	Tyr	Ile	Glu	Asn	Asp	Phe	Pro	Ile	Asn	Glu	Leu	Ile	Leu	Asp		
				485					490					495			
acc	gac	ctg	ata	agt	aaa	atc	gaa	ctg	ccg	agc	gaa	aac	acc	gaa	agt	1536	
Thr	Asp	Leu	Ile	Ser	Lys	Ile	Glu	Leu	Pro	Ser	Glu	Asn	Thr	Glu	Ser		
			500					505					510				
ctg	acc	gac	ttc	aac	gtt	gac	gtt	ccg	gtt	tac	gaa	aaa	cag	ccg	gct	1584	
Leu	Thr	Asp	Phe	Asn	Val	Asp	Val	Pro	Val	Tyr	Glu	Lys	Gln	Pro	Ala		
		515					520					525					
atc	aag	aaa	atc	ttc	acc	gac	gaa	aac	acc	atc	ttc	cag	tac	ctg	tac	1632	
Ile	Lys	Lys	Ile	Phe	Thr	Asp	Glu	Asn	Thr	Ile	Phe	Gln	Tyr	Leu	Tyr		
	530					535					540						
agc	cag	acc	ttc	ccg	ctg	gac	atc	cgt	gac	atc	agt	ctg	acc	agc	agt	1680	
Ser	Gln	Thr	Phe	Pro	Leu	Asp	Ile	Arg	Asp	Ile	Ser	Leu	Thr	Ser	Ser		
545				550					555					560			
ttc	gac	gac	gct	ctg	ctg	ttc	agc	aac	aaa	gtt	tac	agt	ttc	ttc	agc	1728	
Phe	Asp	Asp	Ala	Leu	Leu	Phe	Ser	Asn	Lys	Val	Tyr	Ser	Phe	Phe	Ser		
				565					570					575			
atg	gac	tac	atc	aaa	acc	gct	aac	aaa	gtt	gtt	gaa	gca	ggg	ctg	ttc	1776	
Met	Asp	Tyr	Ile	Lys	Thr	Ala	Asn	Lys	Val	Val	Glu	Ala	Gly	Leu	Phe		
			580					585					590				
gct	ggc	tgg	gtt	aaa	cag	atc	gtt	aac	gac	ttc	gtt	atc	gaa	gct	aac	1824	
Ala	Gly	Trp	Val	Lys	Gln	Ile	Val	Asn	Asp	Phe	Val	Ile	Glu	Ala	Asn		
		595					600					605					
aaa	agc	aac	act	atg	gac	aaa	atc	gct	gac	atc	agt	ctg	atc	gtt	ccg	1872	
Lys	Ser	Asn	Thr	Met	Asp	Lys	Ile	Ala	Asp	Ile	Ser	Leu	Ile	Val	Pro		
	610					615					620						
tac	atc	ggc	ctg	gct	ctg	aac	gtt	ggc	aac	gaa	acc	gct	aaa	ggc	aac	1920	
Tyr	Ile	Gly	Leu	Ala	Leu	Asn	Val	Gly	Asn	Glu	Thr	Ala	Lys	Gly	Asn		
625					630					635					640		
ttt	gaa	aac	gct	ttc	gag	atc	gct	ggc	gca	agc	atc	ctg	ctg	gag	ttc	1968	
Phe	Glu	Asn	Ala	Phe	Glu	Ile	Ala	Gly	Ala	Ser	Ile	Leu	Leu	Glu	Phe		
				645					650					655			
atc	ccg	gaa	ctg	ctg	atc	ccg	gtt	gtt	ggc	gct	ttc	ctg	ctg	gaa	agt	2016	
Ile	Pro	Glu	Leu	Leu	Ile	Pro	Val	Val	Gly	Ala	Phe	Leu	Leu	Glu	Ser		
			660					665					670				

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tac atc gac aac aaa aac aag atc atc aaa acc atc gac aac gct ctg 2064  
 Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu  
 675 680 685  
 acc aaa cgt aac gaa aaa tgg agt gat atg tac ggt ctg atc gtt gct 2112  
 Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala  
 690 695 700  
 cag tgg ctg agc acc gtc aac acc cag ttc tac acc atc aaa gaa ggt 2160  
 Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly  
 705 710 715 720  
 atg tac aaa gct ctg aac tac cag gct cag gct ctg gaa gag atc atc 2208  
 Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile  
 725 730 735  
 aaa tac cgt tac aac atc tac agt gag aag gaa aag agt aac atc aac 2256  
 Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn  
 740 745 750  
 atc gac ttc aac gac atc aac agc aaa ctg aac gaa ggt atc aac cag 2304  
 Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln  
 755 760 765  
 gct atc gac aac atc aac aac ttc atc aac ggt tgc agt gtt agc tac 2352  
 Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr  
 770 775 780  
 ctg atg aag aag atg atc ccg ctg gct gtt gaa aaa ctg ctg gac ttc 2400  
 Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe  
 785 790 795 800  
 gac aac acc ctg aaa aag aac ctg ctg aac tac atc gac gaa aac aag 2448  
 Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys  
 805 810 815  
 ctg tac ctg atc ggt agt gct gaa tac gaa aaa agt aaa gtg aac aaa 2496  
 Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys  
 820 825 830  
 tac ctg aag acc atc atg ccg ttc gac ctg agt atc tac acc aac gac 2544  
 Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp  
 835 840 845  
 acc atc ctg atc gaa atg ttc aac aaa tac aac agc taa tag 2586  
 Thr Ile Leu Ile Glu Met Phe Asn Lys Tyr Asn Ser  
 850 855 860

&lt;210&gt; 175

&lt;211&gt; 860

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum

&lt;400&gt; 175

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
 1 5 10 15

Asn Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg  
 20 25 30

Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
 35 40 45

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Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
 50 55 60

Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
 65 70 75 80

Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe  
 85 90 95

Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
 100 105 110

Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
 115 120 125

Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
 130 135 140

Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
 145 150 155 160

Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
 165 170 175

Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
 180 185 190

Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
 195 200 205

Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
 210 215 220

Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
 225 230 235 240

Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
 245 250 255

Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
 260 265 270

Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
 290 295 300

Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr

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305		310		315		320
Lys Asn Lys Phe	Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly					
	325			330		335
Lys Tyr Ser Ile	Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu					
	340		345		350	
Met Phe Gly Phe	Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys					
	355		360		365	
Thr Arg Ala Ser	Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys					
	370		375		380	
Asn Leu Leu Asp	Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile					
	385		390		395	400
Ser Asp Lys Asp	Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile					
	405		410			415
Asn Lys Gln Ala	Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr					
	420		425			430
Lys Ile Gln Met	Cys Ser Ala Ile Glu Gly Arg Ala Pro Gly Ile Cys					
	435		440		445	
Ile Asp Val Asp	Asn Glu Asp Leu Phe Phe Ile Ala Asp Lys Asn Ser					
	450		455		460	
Phe Ser Asp Asp	Leu Ser Lys Asn Glu Arg Ile Glu Tyr Asn Thr Gln					
	465		470		475	480
Ser Asn Tyr Ile	Glu Asn Asp Phe Pro Ile Asn Glu Leu Ile Leu Asp					
	485		490			495
Thr Asp Leu Ile	Ser Lys Ile Glu Leu Pro Ser Glu Asn Thr Glu Ser					
	500		505			510
Leu Thr Asp Phe	Asn Val Asp Val Pro Val Tyr Glu Lys Gln Pro Ala					
	515		520		525	
Ile Lys Lys Ile	Phe Thr Asp Glu Asn Thr Ile Phe Gln Tyr Leu Tyr					
	530		535		540	
Ser Gln Thr Phe	Pro Leu Asp Ile Arg Asp Ile Ser Leu Thr Ser Ser					
	545		550		555	560
Phe Asp Asp Ala	Leu Leu Phe Ser Asn Lys Val Tyr Ser Phe Phe Ser					
	565		570			575

Met Asp Tyr Ile Lys Thr Ala Asn Lys Val Val Glu Ala Gly Leu Phe  
580 585 590

Ala Gly Trp Val Lys Gln Ile Val Asn Asp Phe Val Ile Glu Ala Asn  
595 600 605

Lys Ser Asn Thr Met Asp Lys Ile Ala Asp Ile Ser Leu Ile Val Pro  
610 615 620

Tyr Ile Gly Leu Ala Leu Asn Val Gly Asn Glu Thr Ala Lys Gly Asn  
625 630 635 640

Phe Glu Asn Ala Phe Glu Ile Ala Gly Ala Ser Ile Leu Leu Glu Phe  
645 650 655

Ile Pro Glu Leu Leu Ile Pro Val Val Gly Ala Phe Leu Leu Glu Ser  
660 665 670

Tyr Ile Asp Asn Lys Asn Lys Ile Ile Lys Thr Ile Asp Asn Ala Leu  
675 680 685

Thr Lys Arg Asn Glu Lys Trp Ser Asp Met Tyr Gly Leu Ile Val Ala  
690 695 700

Gln Trp Leu Ser Thr Val Asn Thr Gln Phe Tyr Thr Ile Lys Glu Gly  
705 710 715 720

Met Tyr Lys Ala Leu Asn Tyr Gln Ala Gln Ala Leu Glu Glu Ile Ile  
725 730 735

Lys Tyr Arg Tyr Asn Ile Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn  
740 745 750

Ile Asp Phe Asn Asp Ile Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln  
755 760 765

Ala Ile Asp Asn Ile Asn Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr  
770 775 780

Leu Met Lys Lys Met Ile Pro Leu Ala Val Glu Lys Leu Leu Asp Phe  
785 790 795 800

Asp Asn Thr Leu Lys Lys Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys  
805 810 815

Leu Tyr Leu Ile Gly Ser Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys  
820 825 830

Tyr Leu Lys Thr Ile Met Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp  
835 840 845

Thr	Ile	Leu	Ile	Glu	Met	Phe	Asn	Lys	Tyr	Asn	Ser
850						855					860